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in "strength"

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DYESTUFF REPORTER

VOLUME 41 JUNE 23, 1952 NUMBER 13

PEANUT PROTEIN FIBERS — FLOW CHARACTERISTICS OF SPINNING SOLUTIONS AS AFFECTED BY RATE OF EXTRUSION

JETT C ARTHUR, JR and HUGH G MANY*

Southern Regional Research Laboratory†
New Orleans, Louisiana

In the preparation of peanut protein fiber the loss in head in a section of the extrusion system per unit volume of spinning solution delivered decreased with increasing rate of extrusion. This indicated that the fluidity of spinning solutions of peanut protein is affected by rate of extrusion. Consequently, an optimum rate of extrusion could be determined for each extrusion system to minimize the loss in energy in the system per unit volume delivered.

INTRODUCTION

THE mechanical aspects of the operation of a pilot-scale fiber-spinning plant when used to prepare peanut protein fibers were previously described in a report from this Laboratory *(3)*. The rheological behavior of the protein solutions is also a factor in fiber preparation. For example, it has been reported that concentrated alkaline solutions of peanut protein are thixotropic in nature *(5, 8-13)*. It could be expected that the greater the rate of extrusion of the spinning solution, the greater would be the apparent fluidity. Exact knowledge of the flow characteristics at different rates of extrusion would permit selection of the rate at which the maximum amount of solution could be extruded with the minimum of energy per unit volume delivered.

The purpose of this report is to present data on the losses in head in a section of the extrusion system under different rates of extrusion in spinning peanut protein fiber and to suggest practical interpretations of these data.

EXPERIMENTAL

APPARATUS——A torsional wire viscometer *(6)* was used to determine the viscosity of the protein dispersion, as a control, and of the spinning solution. The apparatus has two concentric cups; the inside cup is suspended into the solution by means of a standard wire; the other, containing the solution, is driven by means of a variable speed motor. The apparatus was calibrated at 77° F with oils obtained from the National Bureau of Standards.

The effect of rate of extrusion on the flow characteristics was determined by use of a stainless steel tube (Fig 1), 0.29 inch in diameter and 15.4 inches in length, similar to apparatus used by Schiller *(4)*. The solution was pumped through the tube at a metered rate (2.92 ml per revolution), and the loss in head along the tube was measured by means of a mercury manometer. An enlarged bulb fastened to each end of the tube minimized "end effects", which were considered negligible for the purposes of this study. Total pressures in the system were varied from 48 to 115 psi by adjusting the tube's exit area by means of a valve.

PREPARATION OF SPINNING SOLUTION —— Peanut protein, isolated by the method described by Arthur *et al (1, 2)*, was suspended in water at a ratio of 20 parts of protein to 80 parts of water at 77° F. The solution was agitated for about 15-20 minutes to reduce the particle size of the protein and to hydrate it. Sodium hydroxide, 1.3 parts, was then added to the suspension to alter the charge on the protein molecules and to disperse them into a colloidal solution. Complete dispersion was effected in about 15-20 minutes; the viscosity was about 30 centipoises.

This solution was pumped through a candle filter and then deaerated by allowing it to stand, by applying a vacuum

TABLE I
THE EFFECT OF RATE OF EXTRUSION AND AGE OF PROTEIN SOLUTION ON LOSS IN HEAD IN TUBE

Pump speed rpm	Protein solution number[a] 1 (1.5 hrs)	2 (2.5 hrs)	3 (3.5 hrs)	4 (4.5 hrs)	5 (5.5 hrs)
	Loss in head, psi				
10	0.75	1.27	1.96	2.88	3.67
20	1.50	2.50	3.42	4.59	5.53
30	2.38	3.40	4.36	5.78	6.87
41	2.94	4.38	5.68	6.97	8.03
51	3.44	5.15	6.47	7.81	8.87
64	3.88	5.84	7.26	8.74	9.91
74	4.65	6.37	8.04	9.58	10.68
86	4.76	7.05	8.52	10.25	11.31
96	5.07	7.60	9.35	10.41	11.79
106	5.51	8.12	9.95	11.25	12.29
117	6.05	8.56	10.35	11.65	12.67
126	6.62	8.72	10.79	12.04	13.08
137	7.10	9.56	11.12	12.42	13.42
148	7.49	9.91	11.46	12.75	13.67
160	7.85	10.29	11.79	13.08	13.98
172	8.20	10.56	12.12	13.38	14.21
182	8.52	10.81	12.42	13.59	14.25
193	8.83	11.06	12.69	13.92	14.73

[a] Variation of total pressures in the system from 48 to 115 psi did not significantly affect the results.

* Resigned February, 1952.
† One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U S Department of Agriculture.

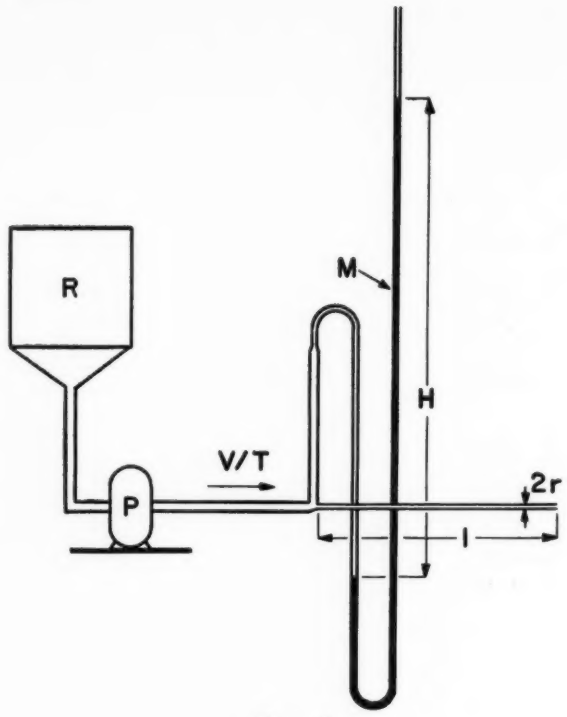

Figure 1

Tube Assembly

2r—diameter of tube
l—length of tube
V/T—volume of liquid flowing through the tube in unit time
R—reservoir for protein solution
M—manometer
P—metering pump
H—loss in head

to the surface of the solution, or both. Then 1 part of n-butyl tartrate was added slowly with mild agitation.

When this procedure for making the spinning solution is carefully followed, solutions with flow characteristics reproducible within a range of 10 to 20% may be prepared. When the protein is not thoroughly hydrated before the addition of sodium hydroxide, the viscosity of the matured solution is not reproducible. Also, the viscosity reaches 10 to 20 poises in about an hour and increases rapidly as the solution is matured. The higher viscosity makes the solution more difficult to filter and deaerate. If n-butyl tartrate (the use of which has been previously reported *(7)*), is not added after dispersion of the protein, the time required to obtain the maximum viscosity of the spinning solution is generally increased.

CONTROL MEASUREMENTS —— Five protein solutions, prepared as described, were reacted with the sodium hydroxide, each for a different period of time (1.5, 2.5, 3.5, 4.5, and 5.5 hours after addition of the alkali) to effect different degrees of unfolding of the globular peanut protein molecules. The relative viscosities of the 5 solutions were measured by the wire viscometer, and were, respectively, 44, 80, 124, 216, and 276 poises. All the solutions contained 20% protein and equal quantities of chemicals.

RESULTS

The effects of rate of extrusion and age of the 5 protein solutions on loss in head in the tube are shown in Table I and Figure 2. These data indicate that the flow characteristics of concentrated peanut protein solutions are not viscous or laminar in nature. The experimentally observed loss in head deviated from the theoretical loss in head, as calculated by means of Poiseuille's equation, in such a manner as to indicate that the fluidity of the solution increases with increasing rate of extrusion or increasing speed of the metering pump.

From Poiseuille's formula, it is known that the loss in head depends on the flow characteristics of the solution, the rate of extrusion of the solution, and the dimensions and shape of the extrusion system, e g, size, roughness of the interior, and length of the pipes. Consequently, the results show only the properties of the solution in the given section of this system. The optimum speed for pumping the solution will be different for each extrusion system. From the data given in Figure 2, it would seem that an optimum pumping speed greater than 70 rpm for this system would be best suited.

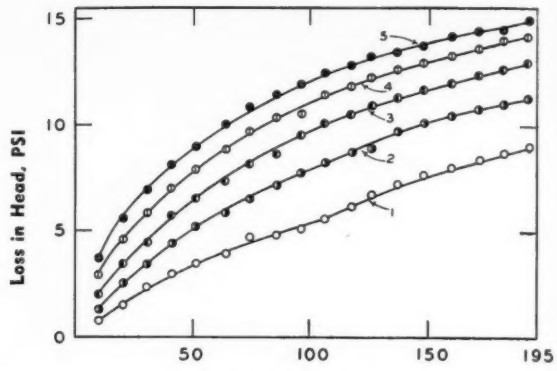

Figure 2

The Effect of Rate of Extrusion of Protein Solution on Loss in Head in Tube

SUMMARY

It has been shown that in the preparation of peanut protein fiber the loss in head in a section of the extrusion system per unit volume of spinning solution delivered decreases with increasing rate of extrusion. This indicates that the fluidity of spinning solutions of peanut protein is affected by rate of extrusion. An optimum rate of extrusion can be determined for each extrusion system to minimize the loss in energy in the system per unit volume delivered.

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ABSTRACTS

Notes on Stabilizing Azoics in Printing

Anon, *British Rayon & Silk J* 28, 63-4, March, 1952.

Stabilized azoic colors require special care in printing to avoid dulling of the shade. One of the ways in which this may occur is by overheating the dyestuff either during preparation of the print paste or in actual printing. This brings about partial breakdown of the molecular structure, with accompanying and proportional development of the dyestuff in the print paste. If the material being printed is stopped for some minutes, that portion in contact with the drying cans will be found to be much lighter and flatter than the rest of the goods. Addition of a stabilizing agent such as neutral sodium chromate to the printing paste will generally lessen this danger.

The following is suggested by the author as a good general formula for the printing paste:

6-8 oz dyestuff
8 oz urea crystals. Paste with
¼ pint thiodiglycol
⅛ pint sulfonate oil. Add
1 pint hot water and
½ pint caustic soda
mixed and poured over the pasted dyestuff. Add
4 pints thickening (starch-trag)
Bulk to 1 gallon.

Prints on spun viscose rayon sometimes have a tendency to rub off. Starchy thickenings should be avoided in such circumstances. In the case of very deep navies, a second aging often improves the fastness to rubbing. An oxidation treatment with acid bichromate is also helpful. Thorough soaping of the prints at as near the boil as possible is strongly recommended.

Development of stabilized azoic dyes by acid aging is the usual method. A mixture of 3 parts of acetic acid 80 per cent and 1 part of formic acid 90 per cent is commonly employed. It is important to see that the acid vapor is uniformly distributed throughout the ager, in order to avoid uneven development. The bottle which feeds acid to the ager should generally be placed where the acid will be distributed in immediate contact with the goods as they enter the ager.

A useful aspect of acid steaming is that if goods appear to be under-developed, a further acid steaming will generally bring about complete development. This, however, is not always the case, as the excess alkali present in some print pastes has been known to resist the effect of the acid, and to that extent result in inferior development. This is specially to be noted where leuco esters of vat dyes are used in mixture with stabilized azoics for the production of green shades.

Faulty azoic prints can be removed from the fiber by treatment in alkaline, acid, or neutral solutions of certain quaternary ammonium salts, according to B. P. 400,239.

Anthrax in the Wool Textile Industry

Dr R Conant, *Canadian Textile J* 69, #9, 63-4; #10, 67-8 (1952).

Anthrax is primarily a disease of cattle and transmitted to man by contaminated hides, hair, and wool. It is caused by a micro-organism which can be identified under the microscope and belongs to a family of spore-forming bacilli. In cattle it produces death by blood poisoning. In man the disease takes several forms, the skin or cutaneous form being the most common, resulting in death by blood poisoning if left untreated.

During the 10-year period between 1939 and 1949 a total of 764 cases of known anthrax were reported in the United States. The hair and wool industry accounted for 479, hides and skins 106, agriculture 97, others 63, and nonspecified 213. A breakdown of the figures showed that 82 per cent of the industrial cases occurred in industries processing hair, wool or both.

The carpet industry contributes by far the majority of anthrax cases which occur in the United States, and the incident rate for the past 10 years has increased threefold. The industry uses coarse wools obtained mainly from the primitive areas of the world, such as North Africa, India, Pakistan and Western Asia.

At present the regular medical treatment for anthrax consists of penicillin in large amounts given hypodermically and intravenously, so that the patient will receive upwards of 1,000,000 U of penicillin the first 24 hours, by vein. This is continued until the second day and longer if necessary. Second, wet penicillin packs 1:3000 solution are applied continuously to the wound.

The prevention of anthrax may be grouped under three main headings: environmental control and plant hygiene, personal hygiene and preventative medicine. It would seem very simple to control environment when one knows that unprocessed, imported wools are the only source of infection in this disease, by sterilizing the wools at the port of entry. This would completely eliminate the hazard. In fact, a recommendation was made to the U. S. Public Health Service in 1943 for the establishment of a disinfection plant in the United States. At that time industrial anthrax had increased 365 per cent, due mainly to the importation of wools and because the cost of individual plant disinfection was prohibitive.

Although the frequency of anthrax is greatest in the picker house, no department of the mill can be considered a 100 per cent safe area. The author gives an outline of the various protective measures which should be employed in the various departments, in order to prevent the occurrence of this disease.

Some Observations on the Wetting of Greige Cotton

R E Wolfrom and A C Nuessle, *Textile Research J* 22, 246-53, April, 1952.

Because of the large volume of cellulose fabrics subjected to wet processing, it is not unusual that most practical methods for measuring the efficiency of wetting assistants employ cotton as the test substrate. Thus, the Draves-Clarkson test, the floating-patch method, the submerged-patch method, the hydrometer method, and the Shapiro tape method all rely upon natural, unboiled cotton yarns or fabrics to provide a hydrophobic substrate. Of all these methods, the Draves test has had the most widespread popularity, due to its simplicity and rapidity of operation.

The present work, which stems from some observations made during routine use of the Draves test, concerns (1) the influence of temperature on the observed wetting time, and (2) the relationship between wet pickup and observed wetting time.

In employing the Draves test over a wide range of temperatures, the authors were puzzled by the shape of the curve for wetting-out time vs. temperature. Ten out of twelve surface active agents tested showed much higher wetting-out times at 180° than at either 150° or 210° F.

The authors offer as an explanation that at the end of the Draves test the skein sinks, but is by no means com-

pletely wet. It has been shown that "wet-out" skeins retain a considerable quantity of occluded air which is only slowly released. As the temperature is raised, the buoyancy of this occluded air increases, but is offset at first by the increased surface activity of the solution with rising temperature, which accounts for the initial decrease in wetting time. When the added buoyancy of the trapped air eventually supersedes this enhanced activity (as occurs with all but a few surfactants), the sinking times increase sharply up to a peak at about 185° F.

The authors further point out that cotton wax has a melting point of about 186° F. They suspected that the melting or softening of the wax was in some way responsible for the rapid drop in wetting time which occurs beyond 180-190° F. They obtained experimental evidence in support of this belief by removing the cotton wax from cotton and substituting other waxes of lower melting points. Skeins so treated did not show the characteristic curve of greige cotton, but the wetting time was near zero by the time the waxes had melted.

In their study of the wet pickup by cotton fabrics padded through solutions of wetting agents, the authors found, among other things, that the pickup by greige cotton increases with the amount of wetting agent used, leveling off only at concentrations considerably in excess of normal use and far above the range of the Draves test.

The Effects of Micro-organisms and Weathering on Man-Made Fibers

C E Coke, *Canadian Textile J* 69, 53-4, 57-8, April 25, 1952.

Mildew is propagated by minute airborne spores of molds or fungi which will grow on many naturally occurring and certain man-made fibers, provided growing conditions are suitable. The latter are generally a moist, warm, dark environment.

Bacteria, on the other hand, usually multiply by simple cell division. As with mildew, they are found in both soil and air, and some genera or species cause rotting of textile materials while others are harmless.

An early study by Thaysen and Bunker of the action of micro-organisms on rayon compared viscose, nitro, cuprammonium and acetate (a) when exposed to a culture of cellulose-decomposing micro-organisms, (b) when given a soil-burial test, and (c) when immersed in sea water. In all three exposures the acetate rayon showed greatest resistance to rotting.

Borlaug made soil-burial and laboratory culture tests on acetate, viscose, cotton, nylon, completely saponified acetate, nylon transparent film and cellophane. He concluded that both acetate and nylon were very resistant to attack, while viscose, cellophane, cotton and completely saponified acetate were entirely destroyed in the soil-burial test, and that since the completely saponified acetate was just as susceptible to attack as viscose and cotton, the resistance of cellulose acetate must be associated with the ester linkage.

Another test described by the author compares the resistance to rotting in soil-burial tests of nylon fabric and film with cotton, viscose, acetate and cellophane film. At the end of three weeks, nylon fabric and film retained about 95 per cent of their original strength, whereas cotton, viscose, and saponified acetate were completely decomposed.

A series of tests was conducted on ropes made from manila fiber, nylon, Orlon and Dacron by immersion in sea water and also by soil burial. At the end of six months' immersion in sea water the ropes retained the following approximate percentages of their original strength: nylon, 70 per cent; Orlon, 90 per cent; Dacron, 87 per cent, and manila fiber, 0 per cent. Similarly, after 18 weeks of exposure to mildew and bacteria in a soil-burial test, the retained strength of the ropes was as follows: nylon, 75 per cent; Orlon, 93 per cent; Dacron, 93 per cent, and manila fiber, 0 per cent.

The author also describes the effect of weathering, for periods of six months and one year, on the tenacity of cotton, nylon, Dacron and Orlon. The resistance of Orlon was quite outstanding (only 5 per cent loss after six months and 30 per cent after a year); Dacron was second best with 40 and 75 per cent loss; nylon followed with 43 and 92 per cent loss; while cotton lost 45 and 99 per cent.

The author states that no specific information on the resistance of Acrilan to micro-organisms is yet available.

The Effect of Micro-organisms and of Weathering on Cotton Textiles

C H Bayley, *Canadian Textile J* 69, 59-62, April 25, 1952.

Research work on the preservation of cotton textiles against micro-organisms and weathering has made great progress, particularly since World War II. It was found in the campaign in the Pacific that vast amounts of cellulosic textiles underwent severe deterioration due to microbiological attack. It was shown that this situation could be improved by the use of a fairly wide range of fungicides or special treatments.

The cellulose-destroying organisms concerned are certain low forms of life comprising various species of fungi and bacteria. These organisms need fairly complex organic substances such as sugars, etc., in order to provide the energy for the operation of their life processes Since they are not themselves able to synthesize these materials, they must obtain them ready-made. They do this by producing a specific type of enzyme which is able to bring about the chemical breakdown of complex substances such as cellulose and proteins to give sugars, amino acids, etc, which can then be used by the organisms.

Indirect evidence suggests that the crystalline portions of cellulose are more resistance to microbiological attack than are the amorphous portions. Thus, for example, ramie which is a much more highly oriented form of cellulose than is the cellulose in cotton has been shown to be more resistant than cotton. Similarly, regenerated cellulose rayons which have been stretched during the spinning operation are considerably more resistant than rayons spun in the normal way.

The word "weathering" is taken to mean exposure outdoors. The chief factors concerned here are the amount and intensity of sunlight; the amount of rain; the incidence of alternate wetting and drying; the range of temperature; the extent of pollution of the atmosphere with corrosive gases; and the intensity of winds. In most cases, the chief agency causing chemical deterioration is sunlight (actinic degradation), followed by such other agencies as microbiological attack, the effect of corrosive atmopheres and the effect of alternate wetting and drying.

Cellulosic textiles exposed to sunlight undergo progressive loss of strength, and this can be shown, by viscosity measurements, to be the result of a decrease in the mean length of the cellulose chain. Certain dyes act as photosensitizers and accelerate the degradation process. On the other hand, certain inorganic compounds (e. g. chromic oxide) have the property of reducing the amount of degradation suffered by cellulose on exposure to sunlight.

In general, the chief factors influencing the growth of micro-organisms on cotton textiles exposed outdoors are temperature (over 70° F), relative humidity (over 80 per cent), location with respect to the ground, and presence of food material on the textiles.

The effect of sunlight in suppressing microbiological growth is well known, and while this is related to a specific effect on the metabolism of the organism, there is little doubt that much of the effect of sunlight lies in its heating up and drying out effect on the organisms concerned and on the cotton itself.

Proceedings of the
American Association of Textile Chemists and Colorists

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Editor of Proceedings: Carl Z Draves, 30 Lahey St, New Hyde Park, N Y

June 23, 1952

CALENDAR

COUNCIL
September 12 (Philadelphia); November 6 (Boston)

GENERAL RESEARCH COMMITTEE
(See Council dates)

NATIONAL CONVENTIONS
November 6-8, 1952 (Hotel Statler, Boston); September 17-19, 1953 (Hotel Conrad Hilton, Chicago); 1954 (Atlanta, Ga).

MID-WEST SECTION
October 4 (Hotel Bismarck, Chicago).

NEW YORK SECTION
September 26, October 24, November 21 (Kohler's Swiss Chalet, Rochelle Park, N J); January 30, February 27 (Hotel Statler, New York, N Y); April 17, May 22 (Swiss Chalet)

NORTHERN NEW ENGLAND SECTION
December 6 (Annual Meeting, Lowell Textile Institute).

PIEDMONT SECTION
Sept 13 (Hotel Charlotte, Charlotte, N C).

RHODE ISLAND SECTION
Oct 24 (Providence Engineering Society); December 5 (Annual Meeting, Sheraton-Biltmore, Providence, R I).

SOUTH CENTRAL SECTION
Aug 22-23 (Outing, Chattanooga Golf & Country Club); December 6 (Patten Hotel).

SOUTHEASTERN SECTION
Sept. 13 (Biltmore Hotel, Atlanta).

WESTERN NEW ENGLAND SECTION
Oct 3, Nov 14 and Dec 12 (Rapp's Restaurant, Shelton, Conn).

OTHER EVENTS

AMERICAN CHEMICAL SOCIETY
7th National Chemical Exposition, Sept 9-13, Chicago Coliseum, Chicago, Ill. This will include the 2nd International Art Exhibit.

AMERICAN OIL CHEMISTS SOCIETY
Short Course industrial trips, July 8-9, 10-11.

AMERICAN SOCIETY FOR TESTING MATERIALS
Annual Meeting, June 23-27, 1952, New York, N Y. (The biennial Apparatus and Photographic Exhibits will be held in conjunction with this meeting).
1953 Annual Meeting, June 29-July 3, Chalfonte-Haddon Hall, Atlantic City, N J.

AMERICAN STANDARDS ASSOCIATION
3rd National Standardization Conference, Sept 8-10, Museum of Science and Industry, Chicago, Ill.
34th Annual Meeting, November 19, Waldorf-Astoria, New York, N Y.

AMERICAN TEXTILE MACHINERY ASSOCIATION
Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantic City, N J.

CANADIAN TEXTILE SEMINAR
September 11-13, Queen's University, Kingston, Ont.

FIBER SOCIETY
Sept 10-11 (Princeton, N J).

INTERNATIONAL COTTON AND RAYON EXHIBITION
Sept 27-Oct 12, Busto Arsizio, Italy.

LEIPZIG FAIR
September 7-17, Leipzig, Germany.

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS
41st Knitting Arts Exhibition, April 27-May 1, 1953, Atlantic City Auditorium, Atlantic City, N J.

NEW YORK BOARD OF TRADE (DCAT)
26th Annual Meeting: September 25-28, Pocono Manor Inn. Pocono Manor, Pa.
27th Annual Drug, Chemical and Allied Trades Dinner, March 5 (1953), Waldorf-Astoria, New York, N Y.

TEXTILE RESEARCH INSTITUTE
23rd Annual Meeting, Nov. 17-18, Hotel Commodore, New York, N. Y.

TEXTILE WORKSHOP
June 16-July 25, Lowell Textile Institute, Lowell, Mass.

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

52-15

Education: BS, Chemical Engineering.
Experience: Textile chemist, technical service and research.

Age: 35; married; references; technical service, advertising-sales or liaison work desired, near New York if possible.

6-23, 7-7

CORRECTION

THE paper "Measurement of Fabric Soiling", which appeared in the May 26th issue, contains an error in the first paragraph under Table I, on page P325. The 6th and 7th sentences read:

"Compton and Hart *(5)* worked with soils of a particle size of 10-100 microns. They found the 10-micron soil to have the greatest darkening power and to be the most difficult to remove by detergency".

The words microns and micron should read "millimicrons" and "millimicron", respectively.

This error was picked up because it was so published in reference *(5)* and a correction was published in *Ind Eng Chem 44*, No 5, page 1137 (May, 1952), which read as follows:

"Primary Particle Size of the Carbon Black. It was found in previous work *(1)* that the primary particle size of the soiling black was a major factor in soil deposition and retention. (The average particle sizes of the carbon blacks used in this previous study were erroneously stated to be microns instead of the correct units, millimicrons.)"

Northern New England Section—

HISTORY AND MECHANICS OF CONVENTIONAL WATER-TREATMENT METHODS*

A W BENOIT
Chas T Main, Inc, Boston

A W Benoit

In an historical review of the changes that have taken place in water supplies for textile manufacturing the author points out that New England was a favorable location for wool and cotton processing because of unlimited supplies of clean soft water. This was important even after cotton spinning and weaving had largely moved South. Now with increasing stream pollution, water treatment is becoming increasingly important.

He then suggests purity standards for textile water supplies and briefly outlines present mechanical and chemical means to correct water that does not meet these standards. An interesting feature of his discussion is a recital of the amounts of water required for various kinds of textile mills and types of processing and dyeing are discussed.

HISTORICAL

THE textile industry had its beginnings in antiquity, and out of the obscure, dim past came fine fabrics of wool, silk, cotton and ramie, and rugs of exquisite design, fine workmanship, superb coloring, and also plain, rough cloths for the less fortunate. Apparently, for centuries there was no appreciable progress or change in technique, as indicated by the exhibits in numerable museums and other places. From time to time discoveries of new vegetable coloring materials added to the existing knowledge, but at the best it was limited and was confined to small details. About the middle of the last century the practice of dyeing was revolutionized by the discovery of artificial dyes, and from this developed a complete new technique.

The early production of textile fabrics was largely done as household craft, each family providing for its own uses. It was not until about 1800 that wool fabrics were made in this country in what might be called a factory. The first establishment in the United States was in Hartford, Connecticut.

The first cotton mill in America was established by Slater in Pawtucket about 1790. Previously, some cotton machinery had been developed in England, but, because of restrictive English laws, could not be imported to this country, and the machinery that went into this plant was built here. From this small, crude beginning has sprung the huge textile industry of this country, which consumes better than 600 million pounds of wool or wool derivatives in an average year, with peaks of better than 700 million pounds per year. At the same time it consumes an average of 9 million bales of cotton as well as 1,000 million pounds of synthetic fibers per year.

Obviously, in the days when the making of cloth was a household craft, there was no conscious water problem. Each producer used the sources that were available, whether well, river, or lake, and the quality was whatever it happened to be. The water might be hard, highly colored, or otherwise contaminated. The user made the best of it and probably was not aware that it made any difference whatsoever in the quality of his product.

As it happened, the textile industry had its early impetus and rapid growth in New England, where there was available unlimited quantities of clean, soft water for process work, and it also furnished the power required to operate many of the mills. Even after the cotton industry reached considerable size in the South, the finishing for the entire industry was largely done in New England.

My first contact with the textile industry as an engineer was in 1909, and at that time most of the woolen and worsted manufacturing, and a large part of the cotton finishing, was in New England. The smaller mills located on rivers were using raw water from that source without treatment because these waters were, in general, of suitable quality, except for color during some parts of the year. The larger mills located in large cities were having more difficulty from mill and domestic waste discharged into the rivers and their tributaries. There were no restrictions regarding this method of disposal, and it was generally assumed that, because of the long continuance of the practice, they had acquired prescriptive rights to pollute streams.

The only treatment used was to strain out the suspended matter, and frequently this was done by the use of open sand filters without any chemical treatment or sedimentation. Frequently, the resultant water was high in color, and occasionally carried odors.

The types of goods produced by the woolen and worsted mills of that period were predominantly of darker shades and of lower quality than produced now.

From 1910 to 1930 there occurred two gradual changes in the industry as far as woolens and worsteds were concerned. One was the deterioration of the quality of waters in the main rivers and also their tributaries because of, in part, increased density of population and accelerated increase in the amount of domestic waste from the more common use of modern plumbing. The other was the change in construction, style and color of fabrics from the so-called "staple goods" to lighter-weight fancy weaves, lighter-shade fabrics. This was true particularly of men's worsted tropical suitings, men's sport wear and women's wear in pastel shades. This change was very gradual in the industry and affected each mill only as it engaged in the manufacture of the newer light-colored materials. As a matter of fact, some mills never made the transition and are still making heavy-weight, dark fabrics, and can process successfully with a poor quality of water. But the other plants, faced with the necessity of

* Presented at the Annual Meeting of the Northern New England Section at the Vendome Hotel in Boston, Mass, on November 30, 1951, as Section II of a program entitled, "Process-Water Treatment for Textile Mills".

obtaining water that would be suitable and of a reasonable quality for the scouring, dyeing and finishing of modern fabrics by present techniques, were forced to take some action and to install equipment fitted to their needs as to quality and quantity of water.

CONVENTIONAL WATER TREATMENTS

I hesitate, in this company, to set up requirements for quality of water, because it is a controversial matter, and because plants are getting equally good results with water of different qualities. I am suggesting, more or less, general limits towards which we should work. Good process water can be well defined by the following more important properties:

Suspended matter	<5 ppm
Color	0.0
Hardness	<20 ppm
Iron	<0.20 to 0.5 ppm
pH	About 7.0

The ordinary mechanical and chemical means used to correct each of these properties is as follows:

Suspended matter can be eliminated by very fine screens, or, better, by a sand filter.
Color can be reduced or eliminated (if it is of vegetable origin) by chemical treatment, flocculation, sedimentation and filtration.
Hardness can be reduced by the use of Zeolite softeners.
Iron, if not excessive, can be reduced by a Zeolite softener, and in extreme cases by aeration and filtration.
The pH can be raised by the feeding of alkali after filtration.

In actual operation the removal of suspended matter, color reduction, and pH correction are all done in one continuous operation. Water softening and reduction of iron are added operations, which can be made part of a continuous operation if desired. If aeration is required to reduce the iron content, it is generally done in a separate step.

The construction and operation of an open sand filter is probably well known to all of you, and its design is well established. A few things to be provided for in an open sand filter are the following:

1) The chemicals should be fed proportionate to the flow.

2) Good mixing by agitation or otherwise must be provided.

3) Detention period must be determined and may be from 2 to 4 hours.

4) Filter beds should be designed for a rate of flow of about 2 gpm per square foot of bed.

5) Sufficient storage of filtered water should be provided for backwashing.

Closed pressure filters are different in construction from open filters, but they only replace open filter beds, and otherwise the operation is the same.

Zeolite softeners may be of the open-bed or closed-pressure type, and are constructed much the same as a filter, except that Zeolite is used instead of sand. A saturated brine solution is pumped through the Zeolite to regenerate it. The volume of water that can be softened after one regeneration is dependent upon the volume of Zeolite and the hardness of the water. A meter is necessary to control this operation properly.

Process water from rivers or ponds is so abundant in New England that we are likely to lose sight of the fact that in some localities water from this source is not available. There are a number of plants which purchase all their process water from a city or town supply at rates that are not too great a burden.

There are also cases where water from rivers or ponds is not available and, because either there is no town supply or it is inadequate, other sources must be sought. The natural answer to this problem is to use shallow-driven or drilled-packed or artesian wells. The obtaining of sufficient water from wells may be very uncertain, and the quality, very poor. Sometimes the water will contain such quantities of iron that economical treatment is impossible, and occasionally the hardness is very high and treatment becomes a problem. It is not uncommon for the water from underground sources to be sufficiently contaminated to require some treatment before being used. And then, on occasion, one will be fortunate enough to obtain large quantities of satisfactory water from a small area. A sufficient number of test or exploratory wells must be driven to check quality and quantities before the final wells are installed.

The quantity of process water required by a worsted or woolen plant is very variable and is dependent upon the kind, quality and amount of fabrics produced, and upon the operations through which the materials pass. Some general quantities, which have been taken from records, would indicate that a 60-loom woolen mill on men's wear operating 120 hours per week uses about 4,500,000 gallons per week, or 5,010 gallons per piece. This would be true for a mill using scoured, virgin wool and noils, and in which all goods were piece-dyed. Another record would indicate that a 100-loom woolen mill on men's wear operating 120 hours week on all stock-dyed material making heavy fabrics, such as overcoatings and heavy suitings, uses about 19,400,000 gallons of water per week, or 10,650 gallons per piece. A wool-scouring and top-making plant, in which the only process requiring substantial uses of water is wool scouring, will not use over 3 gallons per pound of wool scoured, on a clean basis. A worsted weaving and finishing plant on men's wear purchasing white and dyed yarns will use about 3,000 gallons of water per piece of cloth finished.

The quantity of water used by a cotton-finishing plant depends upon the processes which it performs:

A white-goods plant doing only bleaching and white finishes will use about 10 gallons of water per pound of cloth.
A colored-goods plant doing bleaching, dyeing and the required finishing will use about 20 gallons per pound of cloth.
A plant which bleaches, dyes, prints and finishes will use about 25 gallons per pound of cloth.

It must be remembered that these are only general figures, that each plant is a case in itself, and that analysis of the use of water must be made. The figures are indicative of the extent of the problem of furnishing process water for a textile plant.

In New England and the northeast part of this country in general, the abundance of natural waters has minimized the problem of obtaining process water, but it is one of the larger problems that faces plants located in the South. Because of the suspended matter of many southern streams, practically all water used for processing requires treatment. In many localities the water has low dissolved-iron content and is soft, so that satisfactory water can be produced by conventional methods of filtration. However, there are certain areas where there are large deposits of limestone, and in such areas the water is hard, and softening is required. There is also the problem of waste treatment, which is important, particularly with respect to the location of new plants in the area, since practically all of the states now have legislation requiring treatment of industrial waste unless the receiving stream at the site affords dilution large enough to assimilate, without harmful effects, the industrial wastes discharged.

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Meeting Report— UTI Student Chapter

AT a meeting of the Utica Technical Institute Student Chapter on May 11, the following officers were elected:

Chairman—Richard Degan
Vice-Chairman—Edward Janis
Secretary—Betsy Beil
Treasurer—Robert Holland

Another meeting was called on May 21 to discuss plans for the annual picnic.

Subsequently P G Mansuy of Procter and Gamble Co showed a film entitled "Leave Less to Luck", and discussed soaps and other detergents and their uses in the textile industry.

Respectfully submitted,
NORMAN R THOMPSON, *Secretary*

Northern New England Section—

APPLICATION OF CHLORINE IN THE CONTROL OF MICROBIOLOGICAL ORGANISMS IN PROCESS WATERS*

STEWART H NEWLAND
Wallace & Tiernan Co, Inc, Boston

Chlorination as a part of the process of purifying water for textile purposes performs two functions: it controls sliming organisms and it destroys organic matter, which colors many New England waters. The chlorine residual in water, the chlorine remaining after treatment, is of two types: that combined with nitrogen as chloramine and that present as active, or uncombined, chlorine. The author points out that it is hypochlorous acid which destroys sliming organisms, and hypochlorous acid concentration is dependent upon both active-chlorine residual and pH. The addition of chlorine to water for control of slime organisms is explained.

The paper discusses the various types of organisms that are involved in slime formation, including algae, fungi, and bacteria. Iron and sulfur bacteria are especially to be avoided in water for textile uses.

CHLORINATION, by itself or as an adjunct to other water treatment processes in textile mills, performs two major functions: first, the control of sliming organisms, which may foul up subsequent treatment processes and may cause slime spots on finished fabrics, especially in the lighter, pastel shades, and, secondly, the oxidation of organic matter in the fresh water, which causes the high colors existing in most New England surface supplies. Oxidation of iron and manganese by chlorination permits easier removal by subsequent, conventional treatment methods.

Almost without exception, textile-mill location and its selection of a fresh-water supply mean that the waters received in the mill carry a heavy load of soil bacteria, bacteria brought into the water by domestic or industrial pollution, and an abundant quantity of organic material upon which they feed. Waters that may be relatively free of such organisms, even well waters that may show little or no sliming of themselves, can still carry into the system enough organisms to seed the mill thoroughly, and to grow and multiply rapidly under these indeal environmental conditions to the point of causing troublesome slime accumulations, loss of production and impairment of quality of product.

Ideal environmental conditions for organisms in textile mills, in addition to abundant food, include in almost all cases improved temperatures for rapid incubation and occasionally pH ranges that encourage both bacteria and fungi. Mechanically or physically the average mill is so designed or modified or otherwise arranged that it provides further ideal conditions for the seeding of the system and the encouragement of the accumulation of gelatinous or of stringy or rubbery slimes. Once such a system is seeded, slime troubles could persist in spite of the use of a truly sterile fresh water or the installation of conventional treatment facilities for the improvement of the physical and chemical characteristics of the water. Occasionally it is found that unfavorable water-treatment methods actually aggravate sliming conditions. Conventional filters, of either the rapid sand or pressure type, may prove to be the breeding ground of such organisms. Subsequent base-exchange softening facilities are known to harbor slime-forming organisms, and manufacturers of this type of equipment recommend sterilization of the base-exchange media either continuously by prior sterilization of water entering the unit or periodically by sterilization treatments.

If fresh water can be looked upon as a vehicle, then chlorine sterilization of raw water can perform multiple service: it eliminates slime-forming organisms at their source, it improves and makes more uniform the chemical, color, odor and phyiscal clarification by conventional treatment processes, it facilitates the distribution of fresh water within the mill as a sterile means of diluting seeded slime infection, and it widely introduces residual sterilization effects, which further reduce the numbers of slime-forming organisms being circulated in the system.

Most slime samples examined in laboratories yield a wide variety of organisms. Naturally, most slimes contain several forms of air, water and soil bacteria, but, when proper sampling has been done, one species usually predominates.

SLIME ORGANISMS

The organisms outlined here are representative of the common forms most frequently found by the Wallace & Tiernan Research Laboratories in examination of slime samples forwarded from all parts of the United States.

ALGAE —— The simplest and most primitive members of the plant kingdom are the Thallophytes, which are plants not differentiated into root, stem, etc. These are divided into two main series: the algae and the fungi.

The algae most frequently encountered in fresh water belong to the blue-green and diatom groups. Brown and red algae have also been found but their occurrence is confined almost entirely to sea water. Most algae activity occurs in the upper layers of open water bodies where they are exposed to both light and air. The blue-green algae are the lowest of green plants and consist of single cells. However, in many species these cells adhere together to form colonies or filaments. An example of the filamentous form is the Oscillatoria (Fig 1), which has the distinction of being the only blue-green algae that exhibits motility. Figures 2 and 3 show the size and shape of other blue-green algae. However, these photomicrographs fail to reveal the distinguishing characteristics of these organisms. In the blue-green algae the pigment is distributed more or less uniformly throughout the cell material and is not limited to definite colored bodies as is true in most other green plants.

The green algae are the largest and most diverse group and are identified by a bright-green pigment, which is confined to a definite structure in the body of the organism. The chloroplast may be in the form of a twisted ribbon as is seen in the filamentous algae, Spirogyra (Fig 4), or it may be girdle-shaped as in the Ulothrix

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(Fig 5). Many of the one-celled green algae are motile by means of cilia and have a spot of red pigment near one end.

Diatoms are minute one-celled plants having hard, flinty, cell walls impregnated with silica and consisting of two halves, which fit together like a box and cover. The cell walls have intricate markings consisting usually of delicate parallel lines, which can be resolved with a good microscope and proper lighting. Distinctive forms are shown in Figs 6 and 7.

Most algae are sun-loving organisms and will not grow in dark or closed pipe lines. They are readily controlled by additions of copper sulfate, chlorine or phenolic compounds, and their activity should never be used as an index of the efficiency of a slime-control process in industrial water supplies. Most algae contain chlorophyll and have the ability to split oxygen from carbon dioxide by using sunlight as a source of energy and to release free oxygen to the water supply. Occasionally this ability results in a sharp increase in the oxygen content of process waters with attendant serious oxygen corrosion of equipment.

FUNGI——The fungi are Thallophytes that do not contain chlorophyll. Consequently they must live on organic food or energy available from inorganic chemical compounds. These forms vary widely in shape and appearance, the smallest and most common being the microscopic bacteria, which will be discussed later. The larger forms include the well known mushroom. Most fungi are terrestrial plants, although some are semiaquatic in their growth habits. Most are also spore-forming. By this is meant that they develop a secondary life form, dormant in nature, during which the organism is capable of resisting adverse conditions of moisture, heat and chemical poisons. These spores, after having lived through such an unfavorable condition, develop into a fully active stage of life upon the return of a more favorable environment.

The filamentous fungi consist of masses of cobweblike strands called mycelia, which bear a fruiting body containing the spores. Nearly all of these organisms are highly aerobic and do not develop in the absence of oxygen. Pipe lines carrying fairly warm waters, which are infected with filamentous fungi, may become clogged with masses of mycelia.

Fungi filaments are best studied under magnification of 430 diameters, and the individual species may be determined from the appearance and position of the spores. For more critical identification they are cultured on Sabouraud's agar for further microscopic study of their life cycle. Figure 8 shows the structural make-

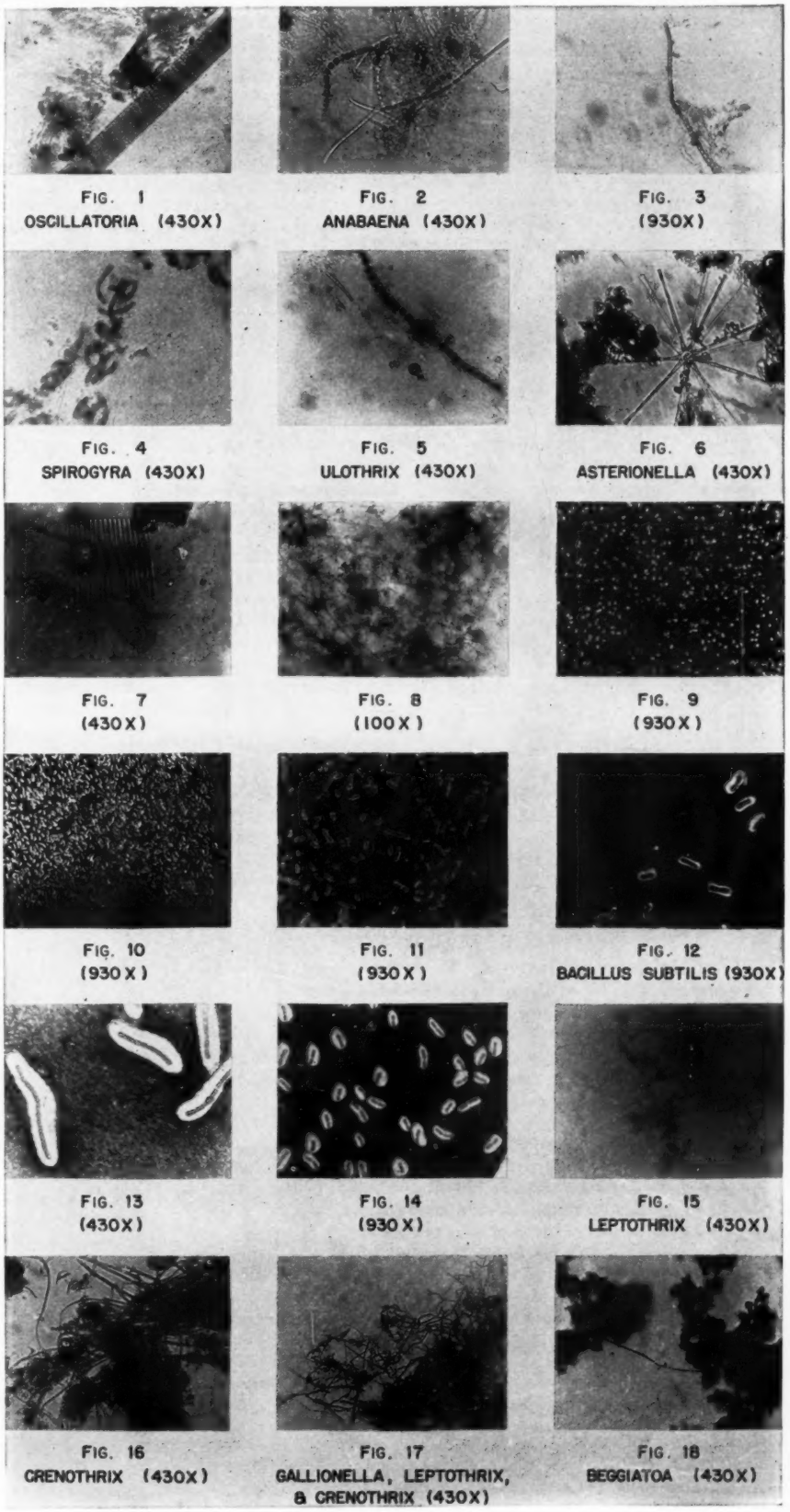

FIG. 1 OSCILLATORIA (430X)

FIG. 2 ANABAENA (430X)

FIG. 3 (930X)

FIG. 4 SPIROGYRA (430X)

FIG. 5 ULOTHRIX (430X)

FIG. 6 ASTERIONELLA (430X)

FIG. 7 (430X)

FIG. 8 (100X)

FIG. 9 (930X)

FIG. 10 (930X)

FIG. 11 (930X)

FIG. 12 BACILLUS SUBTILIS (930X)

FIG. 13 (430X)

FIG. 14 (930X)

FIG. 15 LEPTOTHRIX (430X)

FIG. 16 CRENOTHRIX (430X)

FIG. 17 GALLIONELLA, LEPTOTHRIX, & CRENOTHRIX (430X)

FIG. 18 BEGGIATOA (430X)

up and spore bodies of a fungus encountered in typical industrial slime problems.

BACTERIA——Bacteria are essentially unicellular plants, which sometimes grow in chains or clusters. They are microscopic in size with a very rapid rate of growth. One organism can produce in a few hours millions of organisms in a colony, which can be seen spreading over the surface of agar or of ntaural food material. Bacteria are classified into three structural types: the Coccus which is spherical, the Bacterium or Bacillus which is rod shaped, and the Spirillum which is curved.

Bacteriologists cannot identify bacteria by structural appearance alone, but must rely on reactions to stains, on growth on nutrient materials, on waste products produced, and on color and form of colonies on nutrient media for positive identification.

Some types are aerobic, growing only in the presence of free oxygen, while others are anaerobic, growing only where no free oxygen is available.

Some bacteria are capable of producing spores, while others surround themselves with a gelatinous sheath, or capsule, which protects them against heat, dryness, or chemical treatment for long periods. Special groups of bacteria, which from their appearance would suggest a close relationship to algae or filamentous fungi, are of particular importance in the treatment of industrial waters. The iron bacteria and some of the sulfur bacteria come within this category.

The predominant organisms found in about 50 per cent of the slimes that have been examined at the laboratory are short Gram-negative rods, which produce raised mucoid colonies when cultivated on sugar-enriched nutrient agar. The color of the colonies varies from clean, translucent, to dark-grey, opaque, with many showing white, yellow, or brown tinges. Deeply colored colonies are seldom encountered. Isolated colonies are round with smooth margins and are usually dome-shaped, although many show a depressed center on aging. The organisms themselves are small rods 0.5 to 0.8 microns in diameter and usually about 1 to 2 microns long, although often very short rods are encountered which appear almost as cocci. When stained by the proper method, the capsules appear as halos around the organisms varying from 0.5 to 2 microns in thickness. Examples of these organisms are shown in Figs 9, 10 and 11. Of the short Gram-negative rods which have been examined, a majority have been found to be of the genus, Aerobacter. Aerobacter aerogenes is the most common species. Less frequently encountered are species of genera Escherichia, Alcaligenes, Achromobacter and Pseudomonas.

Most of the remaining 50 per cent of bacteria predominating in the slimes that have been studied are aerobic Gram-positive spore-bearing rods. These are usually large organisms about 1 to 1.5 microns in diameter and 3 to 6 microns long and usually occur in pairs or in long chains. The colonies are most often spreading in nature, and many have a frosty appearance, although some are smooth and viscid during certain stages of growth. The edges of the colonies are usually ragged in appearance, and the color varies from white to light brown. When stained by the India-ink method, capsules are visible which vary from a barely discernible halo to wide zones many times the width of the organism. Examples are shown in Figs 12, 13 and 14. One may observe evidences of spore formation in some of the cells, which become more pronounced as the culture ages.

These aerobic Gram-positive spore-forming rods are members of the genus Bacillus. Although bacteriologists are not in accord completely on the classification of species within this genus, a number of mucoid varients of Bacillus subtilis and Bacillus megatherium have been found in many of the samples studied.

IRON BACTERIA —— Iron bacteria are those that may derive their energy from the oxidation of iron compounds according to the reaction:

$$4FeCO_3 + O_2 + 6H_2O = 4Fe(OH)_3 + 4CO_2 + 81{,}000 \text{ calories}$$

With the energy obtained from this reaction, the organisms synthesize the carbon from CO_2 into cellular material and carry on the processes essential to their life. If the efficiency of the process is assumed to be 5 per cent, which is of the proper order for a biological reaction, about 500 grams of ferrous iron is oxidized to obtain sufficient energy to synthesize 1 gram of carbon into cellular material. The vast amount of iron turned over by the organisms is of no further value to them, but, since these cells are generally covered with an extensive sheath of capsular material, the particles of precipitated iron hydroxide are caught and held close to the cell mass and give rise to slimy deposits.

Bacteriologists recognize two groups of iron bacteria: the Chlamydobacteriales, or filamentous bacteria, and one genus of the Caulobacteriales, the bacteria attached to stalks. Of the former there are three genera involved: the Clonothrix, the Leptothrix (Fig 15), and the Crenothrix (Fig 16), which are differentiated by the way branching occurs in the filaments. All of the organisms use manganous salts as well as or even better than ferrous salts and therefore may have manganese-oxide deposits in the sheath. They can also oxidize organic matter for energy and thus do without the metallic salts, but they generally cannot stand competition with other bacteria in the presence of organic matter. Therefore, under natural conditions, these organisms flourish only in waters low in organic material.

The stalked bacteria, the Gallionella (Fig 17 shows Leptothrix, Crenothrix and Gallionella) were formerly named Spirophyllum because of a twisted-ribbon appearance. It was found that the twisted ribbon is really a stalk of almost pure colloidal iron hydroxide excreted by the small oval bacterial cell at one end. This organism cannot use manganese, and its growth is depressed by the presence of soluble organic matter. It is therefore a true iron bacteria in the strictest sense of the term. Another peculiarity of this organism is that its optimum growth occurs at about 6 to 10° C, so it is often found in well waters, or in the wintertime; in the summer it is replaced by Leptothrix or Crenothrix.

A few other species have been termed "iron bacteria", but confirmation of this work has not appeared. In general, the iron bacteria carry only one important activity, namely, the oxidation of iron and manganese. However, since they undoubtedly synthesize cellular material by means of enzymes and since enzymatic reactions are reversible, it is conceivable that they might also break down organic matter. But, as has been stated previously, any accumulation of organic material will attract other organisms to the disadvantage of the iron bacteria, and, since soluble organic material inhibits some of the iron oxidizing organisms, these possible activities seldom occur.

SULFUR BACTERIA——The bacteria involved in the sulfur cycle in nature are often encountered in industrial process waters. These organisms do not form any uniform group, either morphologically or physiologically. Most common are those that split hydrogen sulfide out of sulfur-containing organic matter. Since most proteins contain sulfur, any proteinaceous material which is broken down by bacteria in the absence of oxygen will yield hydrogen sulfide, and the organism responsible may vary from spore-forming anaerobes to the common colon bacilli.

The process of producing hydrogen sulfide from inorganic sulfur compounds is carried out by one recognized specie, Sporovibrio desulfuricans. This spore-

forming, anaerobic, curved, rod-shaped organism will reduce sulfates, sulfites, and sulfur itself to hydrogen sulfide, using the oxygen liberated in the process to oxidize organic carbon compounds, such as sugar, and thus obtaining for itself a net energy balance. The organism grows best at elevated temperatures, and its presence should be suspected wherever hydrogen sulfide is being liberated from waters containing sulfates but low in organic matter of proteinaceous nature.

Another group of organisms, the Thiobacilli, common inhabitants of soil and of sulfur-bearing waters, derive their energy from the oxidation of sulfur to sulfates. The sulfuric acid thus produced has been blamed for corrosion of metals. These are short Gram-negative rods, which grow only in the presence of abundant oxygen. Most of them obtain their carbon from CO_2 and thus require no organic matter for growth.

A similar function is carried out by a group of so-called "higher bacteria", the Thiobacteriales which oxidize hydrogen sulfide to free sulfur. These organisms grow in long filaments in which can be seen granules of free sulfur and often a purple pigment. They grow in a scum on the surface of sulfide-bearing waters and can be easily detected by microscopic examination of such scums. Figure 18 shows Beggiatoa, one of the more common organisms of this group. It is evident that, in processes involving water containing sulfur in any of its forms, one or more of the above species are likely to be encountered; however, many industrial processes yield hydrogen sulfide by purely chemical means, and this should be determined before intensive bacteriological studies are undertaken.

TRUE SLIME-FORMING BACTERIA ——As has already been noted, a large group of organisms may be responsible for the production of slimes and microbiological accumulations in process water piping, washers, dye vats, etc, in textile mills. The foremost of the true slime-forming bacteria are those which, in the presence of excess food material, will store such food material in the form of complex carbohydrate gels so that it may be used at times of adverse conditions.

When this substance is highly liquid in nature, it diffuses away from the bacterial cell and is known as slime. Some of this slime will adhere to the cell in the form of capsules and cause the organisms to stick together in large masses. Organisms producing large amounts of slimy material can be detected by the viscid nature of the colonies grown on agar plates. Not only do capsules on organisms cause sliming difficulties so often encountered in processes where water is employed, but they give the organisms considerable protection against antibacterial agents, such as heat, dryness and chemicals. Therefore, not only do slime-forming organisms create disturbances that would go unnoticed if a similar number of noncapsulated organisms were growing in the same place, but they are somewhat more difficult to eradicate because of their protective coating.

SLIME CONTROL WITH CHLORINE

After this somewhat lengthy account of the type of slime-forming organisms that may be encountered in textile-mill process water to an extent depending partly upon the degree of treatment involved, we are interested in what may be done toward their eradication and control. We have suggested chlorine sterilization of the raw water.

CHLORINE RESIDUALS —— The chlorination of fresh water has been limited, until recently, by the controls placed upon it. It has been the practice to control such chlorination by applying sufficient chlorine to obtain a marginal or small chlorine residual. No emphasis has ever been placed on the type of chlorine residual, that is, free chlorine residual or chloramine residual, for no means was available for establishing which of these two was being obtained.

If ammonia was being applied along with chlorine, it was assumed, and rightly so, that chloramine residuals were being obtained. Even when ammonia was not being applied, it is now known that many of these small residuals were chloramine, for many waters contain at least enough ammonia or organic nitrogenous compounds to support a residual of small magnitude. To support a chloramine or combined residual of, say, 0.20 ppm requires no more than 0.02 ppm of ammonia or organic nitrogen. Thus, as will be shown, those who practiced such chlorination were thwarted in their endeavors to eliminate slime organisms at their source, to improve and make more uniform the chemical, color, odor and physical clarification by conventional treatment processes and to introduce residual sterilization effects throughout the mill piping system. Such practice never made obtainable a free-available-chlorine residual, which, from the bacteriological angle, is of the utmost importance.

With the progress that has been made in the chlorination of process water and its control, there is available today to every textile mill the opportunity to deliver to all parts of the mill a water that, for all practical purposes, is sterile. This is achieved by applying sufficient chlorine to obtain and to control, not any chlorine residual, but a free available chlorine residual. At first this may be possible at only a few points in the mill; eventually it is possible, as the system is cleared through continued chlorination practice, to do so throughout the entire process-water system of the mill.

Many New England surface waters are so deficient in ammonia content that merely increasing the application of chlorine to give a higher residual will result in a free-chlorine residual. The reason for this is that the maximum chloramine residual obtainable, with the small quantities of ammonia in the water, may be only 0.20 to 0.40 ppm; any further attempt to increase the chlorine residual above this value merely results in the destruction of this chloramine residual and the higher residual is composed chiefly of free chlorine. In a few instances, and this may be especially true when well waters are encountered, the water has been so devoid of ammonia that even the smallest chlorine residual obtainable has been free chlorine. Other waters when chlorinated go to the other extreme. Some contain relatively large amounts of ammonia or organic nitrogenous material and increasing applications of chlorine at first merely result in increasing the chloramine residual. However, if the application of chlorine is still further increased, the chloramine residual will decrease, through destruction, and, if enough chlorine is applied, it will be supplanted by a free-chlorine residual. This reaction takes time, depending upon the quantity of ammonia or organic nitrogenous material present. If applied ahead of conventional treatment processes, there is usually sufficient contact period in settling basins, filters and clear wells for the reaction to carry to completion. If no treatment processes exist, other than chlorination, it may be necessary to construct contact chambers to provide the necessary time interval prior to the water entering the mill piping system.

Any chlorination controlled to a free-chlorine residual, whether the water is devoid of ammonia or not, is known as free residual chlorination. If the chlorination goes through the chloramine destruction cycle, it is free residual chlorination by the Break-Point Process. In such a process care must be exercised in its control to distinguish quantitatively between free-chlorine residuals and chloramine residuals.

Obtaining and then maintaining this free-chlorine residual throughout a mill piping system is of the utmost impor-

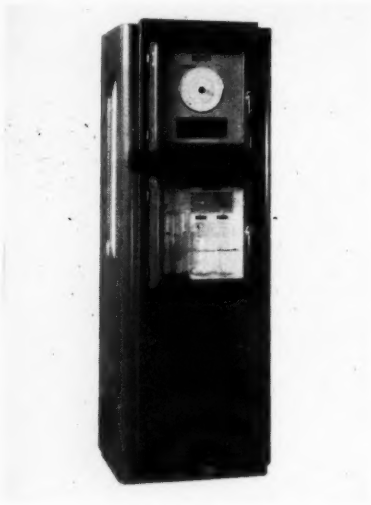

Figure 19
Amperometric Residual-Chorine Recorder

tance. The residual itself should be well understood; the free-chlorine residual is nothing more than a residual or excess of the chlorine in whatever form it has been applied and which has adjusted itself according to the pH of the water.

If the pH of the water is 6.5 or less, the free-chlorine residual is composed entirely of hypochlorous acid (HOCl) and the same as if chlorine water (mo tly HOCl and some free molecular chlorine) had been applied to the water, or the same as if chlorine gas, Cl_2, had been applied to the water and reacted with it. If the pH of the water is increased above 6.5, the free chlorine residual becomes composed of lesser amount as HOCl and greater amounts of hypochlorite ion (—OCl). At a pH of about 7.5 the residual is nearly an equal mixture of each. At a pH of 9.5 to 10.0 and greater, the residual is composed entirely of hypochlorite ion, as if a hypochlorite solution of calcium or sodium had been applied. Thus, whether chlorine is applied as a gas, as chlorine water, or as a hypochlorite, a residual of what has been added is in the form of hypochlorous acid, hypochlorite ion, or a mixture of the two in the water depending upon the pH of the water.

The active killing agent for slime-forming organisms is hypochlorous acid, and thus the pH of the water is important in affecting the relation between hypochlorous acid and hypochlorite ion. The amount of hypochlorous acid and the amount of hypochlorite ion, percentage-wise, always remain the same in the free-chlorine residual just as long as the pH remains constant, although the chlorine residual may be diminishing and the hypochlorous acid rather than the hypochlorite ion may be consumed. Hypochlorous acid and hypochlorite ion are always in equilibrium and in the same equilibrium at a given pH. Thus, at a pH of 7.5, a 0.5 ppm free-chlorine residual would be composed of 0.25 ppm chlorine as hypochlorous acid and 0.25 ppm chlorine as hypochlorite ion. If the water, or piping system, consumes 0.20 ppm of the hypochlorous acid, with a resulting free-chlorine residual of 0.30 ppm chlorine, this free-chlorine residual would not be composed of 0.05 ppm chlorine as hypochlorous acid and 0.25 ppm chlorine as hypochlorite ion, but rather 0.15 ppm chlorine as hypochlorous acid and 0.15 ppm as hypochlorite ion. Although 0.20 ppm chlorine as hypochlorous acid is consumed out of 0.25 ppm originally present, there still remains 0.15 ppm chlorine out of 0.25 ppm originally present for killing organisms. Thus, hypochlorite ion even has a value in that it acts as a reservoir for the active sterilizing agent, hypochlorous acid.

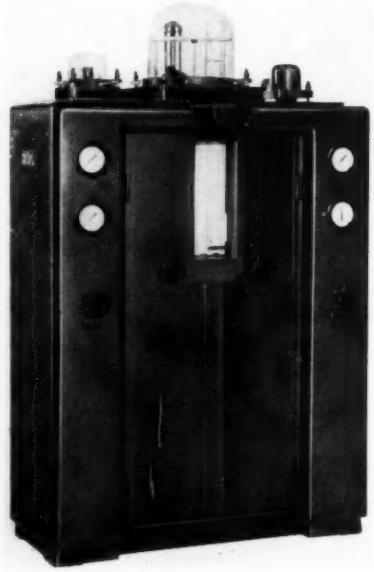

Figure 20
High-Capacity Air-Operated Chlorinator

If a mill distribution system is suspected of containing considerable slime, the free-chlorine residual entering that system should be small at first, say 0.1 to 0.25 ppm, and gradually increased. If the mill has a shut-down period, the piping system, washers, dye vats, etc, can be heavily chlorinated at that time. Observations as to slime sloughing out of pipe lines will regulate the speed with which this chlorine residual may be increased; sampling points within the distribution system will indicate the rate of progress. It is of utmost importance to remember that, eventually, effective slime control will only have been established when a free chlorine residual is established and maintained throughout the distribution system.

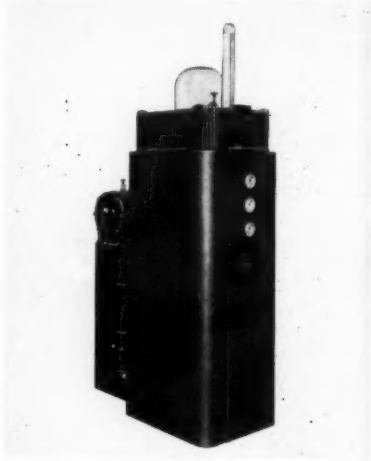

Figure 21
Low-Capacity Hydraulically-Operated Proportional-Feed Chlorinator

The presence of free-chlorine residuals is not, in itself, going to account for corrosion in spite of contrary expectation. Where corrosion has occurred, it has been due to an initial low pH of the water, the natural aggressiveness of the water itself, or a lowering of the pH of unbuffered waters because of chlorination. It is to be remembered that, for every part per million of chlorine applied, approximately 1.2 ppm of the alkalinity expressed as calcium carbonate is neutralized and lost. In many New England surface waters, where alkalinity is quite low, chlorination of any magnitude could result in a loss of a major portion of the alkalinity and could thereby drive the pH down to an unbalanced level. In such cases it is advisable to keep the pH of the chlorinated water up to at least 6.5 by applying sufficient lime, soda ash or caustic soda to the water.

The control of free-chlorine residuals is not difficult; such residuals give an immediate color with orthotolidine as opposed to a slowly developing color in the presence of chloramines. The addition of arsenite immediately after the color is formed with orthotolidine will destroy the chloramines and thereby prevent their reacting with orthotolidine. This gives the operator ample time to read the color value of the free chlorine residuals. Such a residual can also be determined amperometrically by means of an amperometric titrator. In such an instrument free-chlorine residuals cause the passage of a current through a cell, and this current

is indicated on a galvanometer. Chloramines cause no current to be passed. Since only free-chlorine residuals are being determined, it is only necessary to add arsenite solution in terms of residual chlorine until the galvanometer no longer deflects, indicating that the free chlorine is completely neutralized.

An amperometric residual-chlorine recorder, Figure 19, is now available, which provides a chart record of chlorine residuals entering mill piping systems. Essentially, the recorder is a device that takes a continuous sample of the water to be tested, passes the sample through a cell unit, wherein a current is generated proportional to the chlorine content of the sample, measures that current and utilizes it to position a pen arm on a chart, which records the result in terms of parts per million chlorine. Chlorinated water enters the sampling cell through a flow-regulating valve; a buffer solution is added to stabilize the sample and to eliminate errors due to change in the pH of the treated water. The cell contains two metallic electrodes, together with a grit bombardment system, which abrades dirt and other foreign substances from the electrodes. The recorder can be equipped with suitable alarm devices to indicate under- or overchlorination of the water entering the mill distribution system.

Chlorine control apparatus, Figures 20 and 21, is available for all types of textile-mill applications; apparatus which controls the rate of chlorine application in proportion to a variable usage rate within the mill piping system, or appartus which is manually adjusted to apply chlorine to a constant pumpage rate against a constant head. Such manually adjusted apparatus can be provided with suitable controls to automatically start and stop the application of chlorine with water-pump controls.

Chlorine solution from chlorinators may be applied to fresh water pump suction wells, to gravity supply lines under low pressure heads, or to high-head pump-discharge mains. Each prospective chlorinator installation should be preceded by a detailed survey of equipment requirements to meet the needs of a particular mill installation.

Membership Applications

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T Chester Culver—Technical Sales Rep, B F Goodrich Chemical Co, Cleveland, O.

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George E Wilson, Jr—Vice-Pres & Sec, Roane Hosiery, Inc, Harriman, Tenn.

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Manuel A Da Silva—Leeds University, Leeds, England. Sponsor: C S Whewell.

CORPORATE MEMBERS

Cellusuede Products Inc, Rockford, Ill.
Western Felt Works, Chicago, Ill.
Western Piece Dyers & Finishers, Inc, Chicago, Ill.

APPLICATIONS FOR TRANSFER TO SENIOR MEMBERSHIP

Osiris H Bizioli Vincent B Wright, Jr

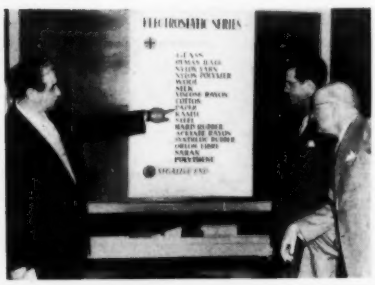
Meeting Report—Rhode Island Section

May 23, 1952
Providence, R I

AT THE May 23rd meeting of the Rhode Island Section at the Providence Engineering Society Hall, Sidney M Edelstein of Dexter Chemical Corp presented a paper entitled: "Static Electricity in Textiles—A Stepchild of Modern Research", and Arthur W Grover of Enterprise Dye Works, Inc delivered a paper entitled "Problems of a Commission Dyehouse Laboratory".

Approximately 60 members and guests enjoyed dinner at the Sheraton-Biltmore Hotel and 195 members and guests attended the technical meeting.

Respectfully submitted,
R G THOMAS, *Secretary*



(Photo by Kenneth C Everett)
(L to r): S M Edelstein, J B Evans, A W Mack (Dexter Chemical Corp)

(Photo by Kenneth C Everett)
(L to r): S M Edelstein, E J Chornyei (Bradford Dyeing), A W Grover Enterprise Dye Works)

(Photos by John E Trezise)

Meeting Report— NBTI Student Chapter

AT a meeting of the Bradford Durfee Technical Institute Student Chapter on April 30, 1952, Robert S Kenyon was elected Chairman, Edward W Mackuch, Secretary, and Gilbert Dias, Treasurer. Thanks were extended to the retiring Chairman, Norman B Weinstein.

Respectfully submitted,

EDWARD W MACKUCH, *Secretary*

1952-53 Meeting Dates of New York Section

THE following meeting dates have been set for the New York Section during the 1952-53 season: September 26, 1952—Swiss Chalet; October 24, 1952—Swiss Chalet; November 21, 1952—Swiss Chalet; January 30, 1953—Hotel Statler; February 27, 1953—Hotel Statler; April 17, 1953—Swiss Chalet; May 22, 1953—Swiss Chalet.

LAPEL BUTTONS FOR MEMBERS

These buttons bear the seal of the AATCC and may be purchased by members in good standing from the National Secretary at $2.00 each.

DR HAROLD C CHAPIN
Lowell Textile Institute
Lowell, Massachusetts

30th Anniversary Meeting, New York Section

May 16th, 1952
Kohler's Swiss Chalet
Rochelle Park, N J

(Additional photos on following page)

(Photos by John J Sokolinski)

1952 NATIONAL CONVENTION
"TEXTILE DYEING & FINISHING EXPOSITION"

HOTEL STATLER
BOSTON, MASSACHUSETTS
NOVEMBER 6, 7, 8, 1952

America Advances Through Creative Chemistry

• PATENT DIGEST •

PAUL WENGRAF

PRINTING VAT DYES—— Alginate Thickened Pigments Overprinted with Reducing Pastes D, 2, 01

U S Pat 2,587,905
(Du Pont——Saville——March 4, 1952)

The preamble to this specification discusses advantages and disadvantages of standard two-step vat printing processes that consist of preprinting the thickened, unreduced vat pigments and developing in reducing solutions. Generally bleeding and marking-off occurs in the second step. Methods of preprinting alkali-hardening thickeners ("Colloresine") combined with vat pigments, whereby the paste is insolubilized in the alkaline reducing bath, were found to show poor penetration.

The present patent suggests that to preprint, the vat pigments be thickened with an easily penetratable substance, preferably sodium alginate, or as alternatives, sodium carboxymethylcellulose or locust bean gum powder. The dried prints are then overprinted by a blotch- or stipple-engraved roller with a paste containing about 2-10% KOH or NaOH and 2-10% sodium hydrosulfite and thickened with starch-British gum, and immediately passed through an air-free steamer for 5-50 seconds at 212° F. The time between overprinting and steaming operations should in no event exceed 20 seconds. In one of the examples the reducing paste consists of starch thickened sulfoxylate-formaldehyde; in this case, the aging time is extended to 6 minutes.

Example: the blue vat dye C I 1113 (Ponsol Blue GD) is thickened with alginate, containing sodium tetraphosphate and a disinfecting agent ("Shirlan A"). The printed fabric is dried and blotch-printed with a paste containing 7% sodium hydrosulfite and 7% NaOH, thickened with a 1:3 starch-British gum paste, then immediately led through an air-free ager at 212° F for 20 seconds, reoxidized with acetic acid-hydrogen peroxide and soaped as usual.

References cited by the Patent Office:

U S Pat 2,487,197 (Du Pont/1949)—— cf *Am Dyestuff Reptr* 39, 191 (1950): the pad-dyeing process, which consists of impregnating with the unreduced vat in dispersed state, then padding with alkali-hydrosulfite at low temperatures and immediately subjecting the goods to the temperature for vatting in a short air-free steam passage.

U S Pat 2,089,920 (Gen Aniline Works /1937): the so-called "Electrofixier" process——fixing vat prints by reducing printed moist fabrics at a temperature below 100° C and fixing the dyestuff at temperatures lower than those used for reducing.

U S Pat 2,069,919 (Imperial Chemical Industries/1937): printing Rapid Fast- or Rapidogen dyes alongside vat dyes by fixing the vat color with a mixture of $FeSO_4$ and $SnCl_2$ instead of Rongalite to avoid damage of the azo dyestuffs by formaldehyde fumes.

U S Pat 1,870,516 (General Aniline Works/1932): vat printing with locust bean gum or other vegetable mucilages by preprinting the dye pigment, thickened with the alkali-sensitive mucilage, and developing the color with sodium carbonate and reducing agents.

PRINTING WOOL with Dyes Containing Acid Groups Thickened with Water Insoluble Vinyl Polymers D, 1

U S Pat 2,589,951
(Ciba Ltd——Meier——March 18, 1952)

This printing method for animal fibers differs from normal procedure in that water insoluble vinyl polymers are used as thickeners, combined with acid liberating agents. Dyestuffs applied in this new process may belong to different groups, for example, acid dyes of the azo- or triphenylmethane class (generally used for coloring wool), some direct and basic dyes, and metal complex dyes provided they are soluble in the polyvinyl organic solution and, preferably, free of inorganic solids. Consequently, the acid liberating agents suitable for this process also have to be soluble in the vinyl thickener. Ethyl tartrate and ammonium chloride (2-6% of the printing paste) are preferred. Ammonium thiocyanate or ammonium tartrate can also be employed.

The vinyl thickener is prepared from insoluble vinyl polymers (polyvinyl acetate and/or polyvinyl chloride), dissolved in solvents that have, at the same time, a softening effect. Examples of these solvent mixtures are butyl acetate or cyclohexanone blended with dibutyl-phthalate.

The inventor states that fixation of the dye is all the more surprising since it was predicted that the dye, embedded in the water insoluble thickener, might not react with the fiber. Actually the normal affinity of the dye to the fiber is evidenced after the goods are dried. The fastness to wet treatments and to crocking are improved by a short steam aftertreatment.

For some types of fabrics that are unfavorably altered by the usual subsequent washing procedure, e g, Jacquard fabrics, taffeta, etc, the present process is especially advantageous since no scouring aftertreatment is required. The thickener can remain in the fabric without undue stiffening. Moreover, no shrinking or yellowing occurs in drying.

18 examples of suitable dyes (basic, triphenylmethane, metallized and non-metallized azo dyes) are enumerated. The printing formulas comprise solutions of one of these dyes in ethylglycol, cyclohexanone, butylacetate, dibutylphthalate (thickened with polyvinylchloride) or acetate-chloride, using ethyltartrate as the acidifying agent. Small amounts of nitrocellulose may be added to reduce the tackiness of the paste.

Although this process is primarily intended for the printing of woolens it may be applied accordingly to other animal fibers, silk, or superpolyamide fibers.

References cited by the Patent Office:

U S Pat 2,052,000 (I G Farben/1936): lacquers prepared by incorporating polymeric vinyl halides of a high chlorine content (about 64% of the compound) with a modified alkyd resin.

U S Pat 1,878,239 (I G Farben/1930): effecting a pigment printing process by incorporating a finely dispersed coloring material in a solvent solution of a urea-formaldehyde, a vinyl, or alkyd-type resin.

Brit P 589,020 (Bener/1947): printing textiles with dyestuffs that are incorporated in insoluble, especially water-repellent dyestuff carriers and fixing agents. The prints are developed by chemically or physically modifying the carrier in such a way that it penetrates the fiber together with the dye and the fixing agent (cf *Am Dyestuff Reptr* 37, 136 (1948).

Correction

ON PAGE 87 of the February 4th issue an incorrect reference to "X-rays" is made in the 3rd paragraph of the digest of U S Patent 2,562,603. Lines 10-11 of the paragraph should read ". . . exposing the goods to u v rays during drying."

NEWS

• Du Pont to Mark 150th Anniversary

The 150th anniversary of the establishment of E I du Pont de Nemours & Company will be marked July 18 at the site of the first Du Pont powder mills on the banks of Brandywine Creek a few miles from Wilmington, Del. The ceremonies, which will include a simple historical dramatic prologue, addresses by company officials, and the dedication of a marker on the site of the first plant, are the focal point of observances by the Du Pont Company.

About 6,000 spectators—representatives from the 71 plants and Wilmington offices, retired employees, members of the du Pont family, and guests—are expected to be on hand for the program, which will be broadcast over a national network.

In the course of the program, Crawford H Greenewalt, president of the Du Pont Company, and Henry B du Pont, vice-president and members of the Executive Committee, will speak, while Walter S Carpenter, Jr, former president and now chairman of the board, will dedicate a marker formed by one of two huge millstones ordered from France by the founder of the company in 1801. The stone weighs about seven tons, and its function, by the application of water power, was to grind the ingredients of black powder. Bronze plaques designed and executed by Domenico Mortellito, Wilmington sculptor, will be mounted upon the stone, which in turn will rest upon a granite base.

The story of Du Pont's growth will be told in a book, "Du Pont—The Autobiography of an American Enterprise", to be published about the first of July. The theme of the volume is the parallel development of the Du Pont Company and the nation over a century and a half. Largely pictorial, with many illustrations in color, the book will relate the company's activities and operations to broad economic and social developments in the United States. One feature of the book will be a map, "The Mills on the Brandywine", by Frank Schoonover, Wilmington artist and illustrator.

The site of the July 18 program is on the property of Mrs Francis B Crowninshield, a direct descendant of Eleuthere Irenee du Pont, founder of the company. She lives in the house that he began building in 1802. The ground floor, as well as the company's first office building, and the small stone house where the founder and his wife lived during their first summer in Delaware, will be open to visitors immediately preceding the anniversary ceremonies.

Spectators will sit in a natural amphitheatre facing the Brandywine. Trees and shrubs that would have blocked the audience's view of the proceedings have been transplanted as part of a landscaping program begun last year and now nearly completed. The drive along the Brandywine and site of the old mills will be open to the public for several weeks following the ceremony.

The ceremony is being held one day in advance of the actual anniversary date, as it was on July 19, 1802, that E I du Pont arrived on the Brandywine to begin construction of his first mill.

• Reeves Brothers, Inc Dedicates Finishing Plant At Bishopville, S C

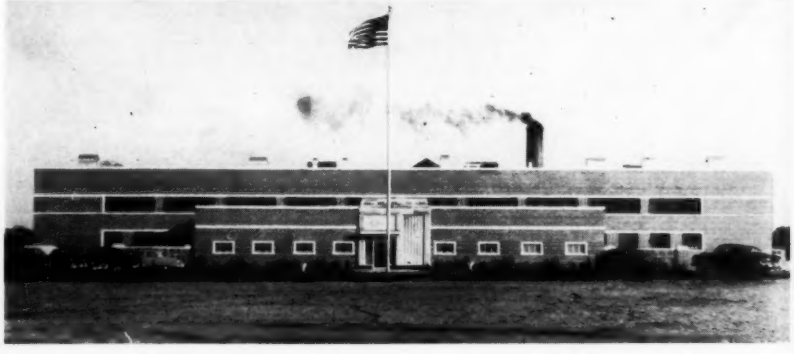
John M Reeves, President of Reeves Brothers, Inc, New York, has officially announced the opening of the Company's new Synthetic Fabrics Finishing Plant in Bishopville, S C, which will be known as "The Bishopville Finishing Company, Division of Reeves Brothers, Inc."

Dedication ceremonies took place Tuesday afternoon at 3:00 P M on June 3, at the main entrance of the building. Speeches were made by state dignitaries from South Carolina and by executives of Reeves Brothers from New York, including The Honorable Bob Cooper, Chairman of the Board of Trustees of Clemson College, who was master of ceremonies, State Senator W P Baskin from Lee County, Mr Reeves, and Admiral Richard E Byrd, who is a director of the Company. A plaque was dedicated marking the completion of the newest of Reeves three wholly-owned finishing plants. Approximately 1,500 townspeople attended the ceremonies. Refreshments followed guided tours of the new building.

At the dedication ceremonies, Senator Baskin pointed out the importance of this new Company in its local value to the community and as another step showing the progress South Carolina is making in the development of the synthetic fabrics industry, after which Mr Reeves explained why Bishopville was selected for a finishing plant. His reasons included personnel, adaptability of the site for processing because of water and climate, and excellent rail and trucking connections.

In addition, Mr Reeves pointed out that Reeves Brothers was making this major step in order to maintain quality control and provide quick service to customers, since the Company has always favored an integrated mill operation.

The new Bishopville Finishing Division reportedly contains the most modern equipment available and was engineered to finish all types of synthetic fabrics in widths up to 64". The brick and steel structure is said to be completely air conditioned and built for future expansion. Complete laboratory facilities are available to develop new finishes and to test output.



Bishopville Finishing Company, Bishopville, S C

Dyed nylon is wound over oil directly from dye tubes to cones, part of the process developed by Central Yarn and Dyeing Company. The machines have been installed as part of a $250,000 synthetics dyeing program.

• C, Y & D Launches $250,000 Expansion Program

Central Yarn and Dyeing Co., Gastonia, N C, has launched a $250,000 expansion program to meet the demand for the firm's newly-developed method of package dyeing of synthetic yarns.

Already installed are the company's new stainless steel high pressure dyeing machines which help make possible uniform dyeing of synthetics in a broad range of colors.

Herbert Girard, director of research and development, said the expansion program, which will include a new laboratory, is scheduled for operation in the fall.

Package dyeing of synthetics is a relatively new activity for the firm. It has mainly been devoted to package dyeing of cotton and some spun rayon and nylon.

Recently, a three-year research program culminated in the development of a new technique for package dyeing of synthetic yarns. Mr Girard said the firm already has dyed successfully commercial lots of filament yarns from the equivalent of 15-denier to more than 2,000-denier. He said good results have been obtained with dyeing of spun and filament yarns made of nylon, Orlon and Dacron as well as various blends of wool and Vicara.

• ACCL Directory Available

The 1952 revised edition of the Directory of the American Council of Commercial Laboratories, Inc is now available upon request without charge. Those wishing a copy should address a request to the executive secretary of the Council, 4302 East-West Highway, Washington 14, D C.

• Allied Chemical Forms New Division

Allied Chemical & Dye Corporation has formed a new division to be known as Nitrogen Division, effective June 1, 1952, to take over the manufacturing and related operations of the Nitrogen and Organic Sections of The Solvay Process Division and the sales of the products involved now handled by The Barrett Division and Solvay Sales Division. The sales and other personnel previously engaged in the activities to be taken over have been transferred to Nitrogen Division and are continuing in their former capacities.

The Solvay Sales Division has become the sales department of The Solvay Process Division, Allied Chemical & Dye Corporation, which continues to be responsible for the production and sale of alkali, chlorine and related products. A B Chadwick is continuing as president and Carlton Bates as vice president of Solvay Process. H F Merritt, formerly executive vice president of Solvay Sales Division, has become vice president of The Solvay Process Division in charge of sales. L B Gordon, formerly vice president of Solvay Sales Division, has become a vice president of The Solvay Process Division.

Hugo Riemer, formerly executive vice president of The Solvay Process Division, is president of Nitrogen Division. Dr M F Fogler, formerly vice president of The Solvay Process Division, and F T Techter, formerly vice president of The Barrett Division, are executive vice presidents of The Nitrogen Division. Dr C S Fazel, who was a vice president of The Solvay Process Division, is now a vice president of the Nitrogen Division.

ADR NOW AVAILABLE ON MICROFILM

Arrangements have been completed with University Microfilms, 313 North First Street, Ann Arbor, Michigan for supplying subscribers of the Reporter with a microfilm edition. This arrangement is effective with the 1952 volume. The film copy will be delivered at the end of the volume year for those who subscribe to the service and it will include all issues published during that period. It is estimated that the film edition requires only 5% of the space required for the paper edition, which is bound. Complete information is available from University Microfilms.

• New Acrylic Monomer

American Cyanamid Company has announced the availability in trial lots of a new acrylic monomer, Acrylamide — a crystalline product with comparatively long shelf life and easily-gained polymerization and copolymerization.

Potential applications for the polymers and copolymers of Acrylamide include the preparation of adhesives, dispersing agents, thickening agents, surface coatings, synthetic leathers and rubbers, and finishing agents for paper and textiles. Modification of acrylonitrile fibers by the incorporation of Acrylamide reportedly produces an approved affinity for acid dyes.

Acrylamide's reactive double bond is said to readily permit the addition of a variety of compounds such as alcohols, amines, mercaptans and dienes. It is reportedly reactive to formaldehyde, forming methylolacrylamide or methylenebisacrylamide, thereby making Acrylamide of value as a chemical intermediate as well as a monomer.

Samples and New Product Booklet No 28 may be obtained by writing to the New Product Development Department, American Cyanamid Co, 30 Rockefeller Plaza, New York 20, N Y.

• Hooker Negotiates 2-Million Dollar Loan

Hooker Electrochemical Company, Niagara Falls, has completed negotiations for a 25-year loan in the amount of $20,000,000, according to a recent announcement by E R Bartlett and R L Murray, Hooker chairman and president, respectively. The loan reportedly has been obtained from The New York Life Insurance Co, John Hancock Mutual Life Insurance Co, New England Mutual Life Insurance Co, Provident Mutual Life Insurance Co of Philadelphia and two others through Smith, Barney & Co and R W Pressprich & Co.

According to the terms of the loan agreement, the notes will bear interest at the rate of 3¾%, and no payments on account of principal are required until May 1, 1957, it is learned. Thereafter, the loan will reportedly be amortized at the rate of $800,000 a year up to and including May 1, 1977.

The company is said to have received the first instalment of $10,00,000 and will borrow the balance on or before November 28, 1952. It has used $6,000,000 of the new funds to retire its outstanding bank loans, it is reported, and will use the balance of the funds for various plant enlargements and improvements both at Niagara Falls and Tacoma and for a new plant to be erected at Montague, Michigan.

Hooker's present expansion program calls for an expenditure of $25,000,000 in the years 1952-53, the announcement said. This will include a $10,000,000 caustic and chlorine plant to be erected at Montague, Michigan; a substantial further expansion of caustic and chlorine capacity at the Tacoma plant; expansion in capacity of many diversified chemicals at Niagara; and additional facilities and plant improvements.

By the end of 1953, the announcement added, Hooker's gross plant and equipment value will approximate $58,000,000, or four times the $14,500,000 value at the end of the 1945.

• Asahi-Dow Ltd Officers Named

Officers and directors have been named for Asahi-Dow Limited, recently formed associate of Dow Chemical International Limited and The Asahi Chemical Industry Company, large Japanese chemical and textile manufacturer.

The announcement was made last month by Clayton S Shoemaker, president of Dow International, wholly-owned subsidiary of The Dow Chemical Company. Asahi-Dow will proceed immediately with plans to build facilities for saran production on the Japanese island of Kyushu, Mr Shoemaker added.

Vice-president of the new company is Max Key, assistant production manager of Dow Chemical's saran department, while the president is Tadayoshi Kitamura, former managing director of Asahi Chemical. No other officers were named.

Mr Shoemaker said each of the participating companies had named six members to the board of directors of the jointly owned corporation. Representing Dow interests are Messrs Shoemaker and Key; Donald Williams, Dow Chemical's director of sales; William A Groening, Jr, Dow Chemical's assistant general counsel; Fred H Brown, Dow Chemical's assistant treasurer; and Leonard C Chamberlain, Jr, Dow Chemical's director of plastics research. Mr Williams is also vice-president, and Mr Groening secretary, of Dow International.

In addition to Mr Kitamura, Asahi representatives on the board are Takenobu Kataoka, president of Asahi Chemical; Kagayaki Miyazaki, managing director; Manabu Enseki, chief of the foreign department; Yoshio Tsunoda, research chief; and Zenzaburo Ueki, manager of the firm's Nobeoka plant.

The companies also named two auditors. Dow will be represented by William R Clulo, treasurer and assistant secretary of Dow International, while Asahi appointed Kazuo Aoki, a former finance minister of Japan.

• Eastman Occupies New Quarters in N Y

The New York offices of Tennessee Eastman Company, Division of Eastman Kodak Company, together with offices of associated Eastman units, moved into new quarters at 260 Madison Avenue, New York 16, N Y on May 26.

Included in the move are The A M Tenney Associates, Inc, exclusive selling agent for Eastman Estron acetate textile fibers; Eastman Kodak Company's New York sales office for Kodapak sheeting; the Tennessee Eastman Company Advertising Departmnet and regional sales offices for Eastman industrial chemicals and Tenite plastics.

The new air-conditioned quarters comprise the entire 6th floor of the recently erected 260 Madison Avenue Building. The move consolidates sales and advertising units previously located at several floors at 10 East 40th Street.

• Atlas Extends Sales Service

The first steps in a proposed widespread extension of the sales service of its Industrial Chemicals Department have been announced by the Atlas Powder Company, Wilmington, Del.

The changes, according to George J King, director of sales for the department, are designed to provide better service for users of Atlas chemicals in New York, Illinois, Indiana, Michigan, Ohio, and Kentucky.

Mr King announced that Glen P Roddey, working from Buffalo, will service customers in northern and western New York, while William A Kessel will continue to operate from New York City in servicing the remainder of the state.

William I Pontius, who recently completed a sales training program at Atlas Central Research Laboratories, has been assigned to the Chicago office to cover parts of Illinois, Indiana and Michigan. John Slaton has been moved from Chicago to Cincinnati to extend Atlas service to the state of Kentucky and the southern part of Illinois, Indiana and Ohio.

The Atlas Industrial Chemicals Department manufactures and markets sorbitol, mannitol, surface active agents for use by a variety of industries, polyester resins and plasticizers.

• DCAT Nominating Committee Appointed

Charles M Macauley (Charles M Macauley & Associates), Chairman of the Drug, Cehmical and Allied Trades Section, New York Board of Trade, Inc, has announced the appointment of the following Nominating Committee: Charles P Walker, Jr (Chas Pfizer & Co, Inc), *Chairman;* Carle M Bigelow (Calco Chemical Division), Harold C Green (L Sonneborn Sons, Inc); Robert B Magnus (Magnus, Mabee & Reynard, Inc); and Fred J Stock (Intermediates Division, Mathieson Chemical Corporation). Lloyd I Volckening (The Ivers-Lee Co), Vice Chairman of the DCAT, and Mr Macauley will be ex-officio members.

It is the duty of this committee to prepare a slate of the new Executive Committee which will be presented for election at the 62nd Annual Meeting of the DCAT to be held at Pocono Manor Inn, Pocono Manor, Pennsylvania, September 25-28.

• Public Course in Management at NBTI

A recent series of ten evening lectures on the subject of "Industrial Organization and Management" sponsored by the Providence Chapter of the American Society for the Advancement of Management at the New Bedford Textile Institute is reported to have been very successful. This series was inaugurated through the efforts of Raphael Mutterperl of the Fairhaven Corporation to make current information in the field of management available to the interested public of the New Bedford area. The lectures, which drew audiences up to three hundred, were attended by about half of the entire student body at the Institute, virtually all of the faculty, and a cross-section of a community interested in Industrial Management, which ranged from heads of corporations down to mill hands.

The outline for the series was prepared by Professor Harrison D Myrick, President of the Providence Chapter, and the Board of Directors of the Chapter suggested appropriate speakers on each topic. These speakers, each an authority in his specific field, volunteered their services as their contribution to the success of the venture. The topics presented were:

1. "Introduction to the Course—Building the Organization"—Dr Lawrence L Bethel, Director of the New Haven YMCA College.
2. "Product Development and Research"—Kenneth V Chace, Director of Research, Hathaway Manufacturing Co.
3. "Production Planning and Control"—Stanley F Banas, Chief Cost Accountant and Director of Planning, Wamsutta Mills.
4. "Quality Control"—Roy Volkman, Quality Control Director, United States Rubber Company.
5. "Methods Analysis, Work Simplification and Time Study"—Peter S Freedman, Director of Personnel and Standards, A Freedman Shoe Co.
6. "Internal Industrial Relations, Personnel Management and Employee Training"—William Brandy, Industrial Relations Director, Firestone Rubber & Latex Co.
7. "Collective Bargaining and Job Evaluation"—Leo St Aubin, Personnel Director, New Bedford Rayon Company.
8. "Sales Promotion, Control and Management"—Cornelius P Gearon, Vice President in Charge of Consumer Products Sales, Wamsutta Mills.
9. "Budgeting Control, Accounting Functions, Business Economics and Finance"—George A Rawcliffe, Assistant Treasurer, Arnold Hoffman & Co, Inc.
10. "Coordination of Enterprise" — Harry S Freedman, Treasurer, A Freedman & Sons.

• Pennsalt, Sharples Chemicals Research Groups to Be Integrated

The Research Department of Sharples Chemicals, Inc, will be integrated with the Research and Development Division of the parent company, the Pennsylvania Salt Manufacturing Co, sometime before Sept 15, it is learned. Meanwhile, laboratory facilities at Whitemarsh Hall are being considerably extended by the conversion of additional rooms to laboratories and rearrangement of existing facilities to provide not only for the addition of Sharples research personnel but also to increase Pennsalt's facilities.

Dr W A La Larde, Jr, manager of Pennsalt's division has announced certain organizational changes to accomplish these objectives. Dr John F Gall, currently supervisor of research, will become director of the Inorganic Research Department, and will be responsible for the company's research work in surface chemistry, inorganic synthesis, electrochemistry and high-temperature chemistry.

Dr John F Olin, director of research for Sharples Chemicals, will be the director of the Organic Research Department in the new organization, with Dr George McCoy, at present Pennsalt's organic group leader, as technical assistant director, and T E Deger, Sharples assistant research director, as administrative assistant director.

William M Lee and Ford R Lowdermilk, at present supervisors of the Product Development and Process Engineering Departments, will become directors of those departments. The Analytical Section will be given department status, with Dr Paul A Munter as supervisor.

Dr Charles E Inman and F E Lawlor will be advanced to group leaders in the Organic Research Department, and the present group leaders in the Sharples Chemicals Research Departments will continue as group leaders in the Organic Research Department.

• ASQC Approves Industry-Wide Divisions

W S Smith, Chairman of the Textile Technical Committee, American Society for Quality Control, has announced that the National Society has approved the intention to form industry-wide Divisions. This action took place at the annual Board of Directors meeting in Syracuse, New York, May 24, President Wade Weaver presiding. The first such Division will be the Textile Division, which is expected to be formally activated in August.

The action is the culmination of efforts of a Steering Committee for the past few months under the Chairmanship of John Reynolds, Celanese Corp of America. Other members of this Committee included R R Jones, Bigelow-Sanford Carpet Co; E G Field, Field and Associates; Dr R A Hefner, Georgia Institute of Technology; G M Hailes, Avondale Mills; Prof D S Hamby, N C State College; and E S Rudnick, Wamsutta Mills.

It is expected that this Division will hold national and regional meetings on a periodic basis to further the science of statistical quality control among textile members. Over 60 petitioners, all ASQC members, throughout the U S and Canadian textile industries had been recorded on May 22 as favoring the formation of this Division. A special textile supplement to the *Industrial Quality Control* magazine will be issued early in August, it is reported.

Another two-day Textile Quality Control Conference will be held in Clemson, S C, August 22-23 sponsored by the Textile Technical Committee of ASQC. A similar Conference last year attracted about 150. At this year's meeting, it is expected that the Textile Technical Committee will be dissolved and the newly-formed Division take over its duties.

Election of Division Officers is to be held prior to the August Meeting by mail ballot. All ASQC members who have signified their intention of being affiliated with this Textile Division will be eligible to vote. Communications regarding this should be addressed to E G Field, Field and Associates, 1101 Hurst Building, Atlanta 3, Georgia.

NEW PRODUCTS AND DEVELOPMENTS

• C & C Coal-Hydrogenation Process

Announcing the successful operation of Carbide and Carbon Chemicals Company's 11-million dollar coal-hydrogenation chemicals plant at Institute, W Va, Dr J G Davidson, president, stated last month that "production of chemicals by coal hydrogenation is now a reality".

Though Carbide and Carbon Chemicals Corporation (a division of Union Carbide and Carbon Chemicals Company) has long been one of the largest producers of aliphatic organic chemicals, this marks the Company's first major venture into the aromatic chemicals field. Research on the coal-hydrogenation project, originally begun in an attempt to find an alternative source for natural or refinery gas, pointed to the fact that the liquid hydrogenation product was rich in coal chemicals. With an ultimate shift in emphasis from gas production to the production of chemicals, research continued and the present plant, with a capacity of 300 tons of coal a day, was built. It is reported that more than 100 chemicals have been identified in the hydrogenation process, many of which are commercially recoverable.

The process is not new, the Germans having discovered it as early as 1913, but Carbide's concept of using it solely for the production of chemicals is an innovation, leading to speculation that it might be possible to place the entire synthetic chemical industry on a coal raw material basis, should it ever become necessary.

The improved yields per ton of coal made possible by hydrogenation of coal over the average recoveries from all by-product coke ovens are reported to be as follows:

naphthalene..... 5 to 8 times more
"Natural" phenol.. 60 to 80 times more
quinoline.....300 to 500 times more
aniline..infinitely greater amounts (since it is not isolated commercially from coke oven by-products).

Here is what has been done to change this uneconomical process for making fuel to a profitable method for producing chemicals:

(a) Reaction time has been cut from nearly an hour to a very few minutes.

(b) The amount of hydrogen needed to make the process go, has been reduced:

(c) Product-refining and the primary liquefaction of coal have been simplified to *continuous processes.*

(d) Engineering design has been advanced to minimize break-downs, operating costs, and labor requirements.

(e) The investment required has been reduced materially.

CARBIDE'S PROCESS —— Coal is crushed to about the size of wheat grains and mixed with recycled oil (recovered from a later stage of the process). The gritty mixture is then pumped into the hydrogenator. Gaseous hydrogen is introduced. The temperature is raised to somewhere between 450 to 550° C and the pressure to 6,000 psi. The coal and hydrogen react to form a liquid product under these conditions—the "chemical manufacturing" step. From here on, the job is one of separating the products of the reaction.

The mixture then goes to a "hot separator" where the pressure is reduced enough to vaporize the sought-after chemicals. The chemical vapor stream is then condensed in a "cold" separator and

the mixture of condensed chemicals is broken into three principal fractions: hydrocarbons, phenols, and nitrogen compounds. Each of these three is broken down still further into individual chemicals and useable chemical mixtures.

The remaining gases are collected and used as follows: the hydrogen is recycled to the process; the other gases are separated and used as fuel, raw materials in chemical manufacture, or sold as bottled gas.

The heavy liquids stream, which remains after vaporization of the chemical products in the "hot separator", is treated to remove the ash and unreacted coal, then distilled into two fractions: the recycled oil, which goes back into the hydrogenation process, and a residual oil ultimately to be made into coke.

Carbide looks to the new plant to provide coal chemicals for sales development work, operating and engineering experience for future plants with improved designs, and commercial amounts of raw materials for new chemical products.

• Colormaster Differential Colorimeter

A new product of Manufacturers Engineering & Equipment Corp, Willow Grove, Pa, is proving useful in obtaining accurate color measurements of synthetic fibers, liquid solutions, pigments, etc. Known as the "Colormaster Differential Colorimeter", the instrument is similar to that described by L G Glasser and D J Troy of du Pont at the March meeting of the Optical Society of America in New York.

A complete set of color measurements can be made with the Colormaster in less than thirty seconds, it is reported. The new instrument has a system sensitivity appreciably greater than the eye can discern, and is particularly useful for measuring differences between similar colors for process control applications. It is said to be simple to operate, and results are taken directly from an easy-to-read dial.

Three color filters give approximations to the ICI X, Y, and Z functions, and transmissions and reflections are measured directly. The linearity of the instrument is reportedly within approximately 0.2 per cent reflectance or transmission down to 10 per cent; by standardizing on a known dark panel, the range can be extended far below 10 per cent, with linearity within approximately 0.02 per cent. The dial can be read to 0.1 per cent, and hundredths of a per cent can be readily estimated, it is claimed. The dead zone (back-lash) reportedly does not exceed 0.02 per cent reflectance or transmission.

Because the Colormaster is highly stable after a warm-up of about one-half hour,

"Colormaster" Differential Colorimeter

it requires infrequent standardization. Magnetic shielding is included to permit measurement of colors where steel panels may be used. The electrometer input impedance is said to be about 6,000 megohms. Two calibrated panels are furnished with the instrument. Standard dark panels are available as accessories.

The Colormaster is vibration-proof and requires very little maintenance, it is claimed, and it is not subject to humidity effects. Operation is from 60 cycle 115 volt power mains, and the power required for the instrument is approximately 65 watts.

• Geigy Adds Two Dyestuffs

Geigy Company, Inc, 89-91 Barclay St, New York, N Y, has announced the addition of two new dyestuffs — Solophenyl Brown B L to their Solophenyl series and Polar Red BL to their Polar line.

Solophenyl Brown B L is said to produce pleasing shades with excellent resistance to light. Anticrease urea-formaldehyde aftertreatments do not materially alter the shade and have very little influence on the light resistance of this dyestuff, it is claimed.

Solophenyl Brown B L is distinguished for reserving acetate when dyeing mixed fabrics containing cotton or viscose rayon and acetate, and can therefore be used for producing browns to replace blue, red and yellow mixtures which give inconsistent results, it is pointed out.

Solophenyl Brown B L is said to have almost the same affinity for cotton and rayon and unlike most fast-to-light direct browns, will produce uniform and solid shades on fabrics made with both fibers. This dyestuff should prove useful to manufacturers of cotton back and rayon face drapery and upholstery fabrics.

In Geigy's opinion, Polar Red BL represents an outstanding dyestuff which fills the long-felt need for a blue shade of red with exceptionally good light fastness that will exhaust well from a neutral bath. They point out that Polar Colors have, for years, been noted for their good all around fastness properties, especially their resistance to fulling and ability to withstand a Chrome bath. Polar Red BL is said to measure up to its predecessors quite favorably in all these respects. Another outstanding feature of this color is its ability to dye a solid shade on tippy wool.

It is the Company's belief that Polar Red BL will prove to be very useful for the dyeing of slubbing, raw stock, and union goods where the end use requirements call for extremely good light and wet fastness. Polar Red BL is also said to be well adapted for the dyeing of spun or filament nylon, either raw stock or piece goods.

Bulletins on each, as well as samples, will be sent to interested parties on request.

• New Finish for Improving Seam Efficiency

Amalgamated Chemical Corporation, Philadelphia, has developed a new finish, Velubra-H, for improving the seam efficiency and sewability of fabrics.

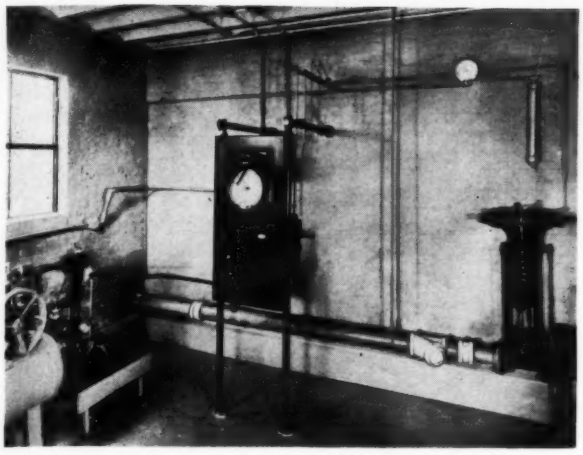
Amalgamated chemists report no yarn severance in sewing when fabrics are treated with a 5% solution of Velubra-H. In normal seaming operations on untreated fabrics, it is reported that 13% of the warp threads are severed, with a resultant weakening of the finished garment.

When a fabric is treated with Velubra-H, it is stated, needles by-pass yarns rather than cut through them, making a treated sewn fabric equally as strong as a treated unsewn fabric.

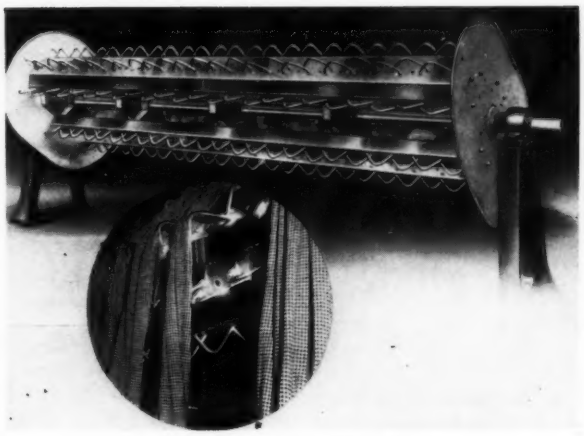
In high-speed commercial sewing considerable heat is generated, sometimes to the extent that synthetic fibers melt. Needles become clogged, slip-stitching occurs and the sewing threads break. Often static electricity becomes an annoying factor. Velubra-H reportedly reduces friction and prevents static, in addition to giving a desirable soft "hand" and materially improving fabric cutting characteristics.

Velubra-H is a nonionic polyester of a completely saturated high molecular weight aliphatic acid. It is a water-dispersible light tan cream that reportedly will not discolor or turn rancid. It is said to be nontoxic, colorless, odorless and completely harmless to the fabric. It is also said to be especially beneficial to materials woven of blended fibers, but is recommended for all cotton wool and synthetic goods.

Velubra-H is available in 50 gallon open-head, returnable drums. Technical data sheets are available from the manufacturer.



Pumping station at a New England bleachery features a Foxboro Dynalog pH Controller in the center. At the left is a flow-type electrode mounted above a circulating pump. At the right, a 3" Saunders patent valve, regulating the flow in the acid waste line.



The Hunter NO/LAP Reel.

Close-up shows cloth passing between V bars which may be adjusted to eliminate tight or loose strands.

• pH Control Solves Bleachery Waste Problem

Acid and alkaline wastes at a prominent New England textile finishing plant are effectively neutralized under Foxboro pH Control, furnishing conditions for optimum biological activity and efficient waste disposal.

The separate wastes are collected in equalization tanks. To create a neutral pH condition in the underground mixing basin, a closely regulated flow of acid waste is mixed with the alkali. The resulting effluent is then further treated on trickling filters.

pH is controlled by a Foxboro Recording Dynalog Controller located in the pump house. A small circulating pump supplies a continuous sample to a flow-type electrode. As the measured pH changes, the controller operates a 3" rubber-lined Saunders patent valve in the acid line to maintain the desired condition.

Since the efficiency of this waste disposal system depends on an unchanging neutral pH, it is desirable that control be automatically maintained within the desired tolerance limits despite variations in acid and alkaline waste concentration and rates of flow.

Description of a similar waste disposal installation is contained in Data Sheet 833-5. Copies will be sent on request from The Foxboro Company, 26 Neponset Avenue, Foxboro, Mass.

• Hart Products Introduces New Synthetic Detergent

Hart Products Corporation, New York, is now marketing "Hartopon B", a new development in the field of synthetic detergents. The product is a pure white paste, which is said to display excellent detergency and sudsing action, and is classified as a modified fatty alcohol sulfate.

Manufactured for the textile industry in high concentration, Hartopon B is recommended by the manufacturer for use in virtually all cleaning operations, such as the scouring of silk, cotton, rayon, acetate, wool, nylon, Orlon and Dacron. It is pointed out that the product may be used with great efficiency and economy in jig and box type scouring, in kier boiling, in soaping-off prints and for removal of sizing oils and dirt. It is further pointed out that Hartopon B is stable in the presence of oxidizing and reducing agents; reduces the harshening effect of vigorous scouring procedures; and possesses outstanding protective action, dispersing power and detersive qualities.

Other features of the product, as outlined by Hart Products, are its effectiveness in very low concentrations, thorough cleaning and rapid and complete rinsing in hard or soft water, low cost, high activity and wide range of uses.

• Scher Brothers Markets Ribbonset Finish

Scher Brothers, Clifton, N J, have begun marketing Ribbonset Finish, a newly-developed alkyd resin dispersion, which is said to completely eliminate the need for curing. Ribbonset Finish imparts a hard film to all fibers and retains luster without causing shade change, it is claimed.

Called Ribbonset Finish because one of its most important uses is its application to acetate satins where a parchment-like hand is desired without mark-off, the new product is also recommended by the manufacturer as a firm finish for taffetas, ninons, bedspread finish, blanket binding finish and underwear satins.

• Hunter No/Lap Reel

An important improvement in dyebeck efficiency is incorporated in the new Model A Dyebeck of the James Hunter Machine Company, North Adams, Mass.

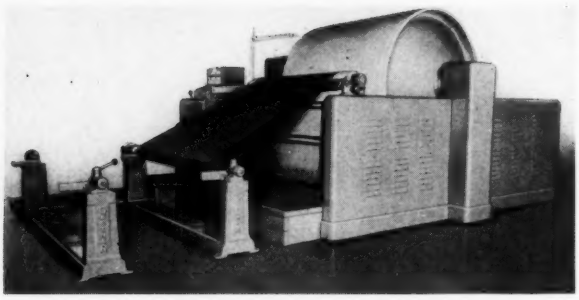
The novel Hunter No/Lap Reel*, which entirely eliminates the need of providing traction by covering the dye reel with cloth, canvas or rubber, is the key to major dyehouse savings in material, labor and work scheduling, according to the manufacturer. The No/Lap Reel reportedly has been in continued production use on cottons, synthetics and blends at both the United Piece Dye Works, Lodi, N J, and the Cliffside Dyeing Corporation, Paterson, N J.

Since most cotton and rayon fabrics will not pull properly on conventional stainless steel reels, universal practice calls for the reels to be wrapped (or lapped) with cloth or duck, thereby losing the big advantage of being quickly cleaned. Another difficulty is the scheduling of work through a dyehouse when certain becks must be kept on certain shades, or else relapped each time the shades are changed.

The unique feature of the No/Lap Reel is the arrangement of inverted V-bars, which gives a gentle but firm gripping action to each strand of cloth in the machine. Two rows of these bars are made adjustable so that goods can be run continuously in one strand during the dyeing operation. The bars can be raised or lowered to give proper tension to each strand of cloth. On the ends of the reel, they can be further adjusted to take care of the cloth passing from one end of the reel to the other, as in spiraling.

The No/Lap Reel may be ordered separately for installation in any make dyebeck, it is reported.

* Patent Pending



Gessner 60" Versamatic Semi-Decating Machine

• Gessner Announces Larger Versamatic

The David Gessner Company, Worcester, Mass, has announced a new 60" Versamatic Semi-Decating Machine, which has been engineered with the same features made famous by the 36" Machine that was introduced at the 1950 Textile Machinery Show in Atlantic City. The 60" machine has been in mill operation for some time.

The main feature of the 60" Versamatic is the quantity of material that can be processed uniformly at a single loading. Full sets of woolen and worsteds and thousand yard rolls of synthetics are successfully handled, it is claimed. The machine has been designed to take the cloth from either a roll or fold and to deliver the cloth in either a roll or a fold. Uniformity of finish is said to be assured by automatic apron tension control and controlled pressure roll, combined with Gessner's automatic cycle control for both steaming and cooling.

Another feature of the machine is the automatic apron guide, which keeps the apron dressed evenly to one side. The "infinitely variable speed" hydraulic drive reportedly assures smooth running operation in both directions with fingertip control. This drive is designed to keep the correct tension on the apron even at high speeds.

The design of the Gessner steaming cylinder precludes wetting the apron, it is stated. Rapid cooling at low horsepower is another feature of the machine, which will reportedly operate at extremely high or extra low speeds.

• AMC Announces Lemol Polyvinyl Alcohol

From the large number of possible combinations of viscosity and degree of hydrolysis, American Monomer Corporation, Leominster, Mass, has selected six standardized grades of polyvinyl alcohol for manufacture under the trade-name "Lemol", representing the most widely-used types.

The grades include:

(1) High viscosity and completely hydrolyzed—for warp and fill size for cotton and viscose yarn, thickening agents, etc.

(2) Medium viscosity, completely hydrolyzed—temporary protective coatings.

(3) Low viscosity, completely hydrolyzed—for higher working concentrations.

(4) High viscosity partially hydrolyzed for use as protective colloids, emulsifying agents, thickening agents, extenders for polyvinyl acetate emulsions.

(5) Medium viscosity, partially hydrolyzed——for higher working concentrations than other types as protective colloids, emulsifying agents, thickening agents, remoistenable adhesives, warp size for acetate and nylon yarn and temporary protective coatings.

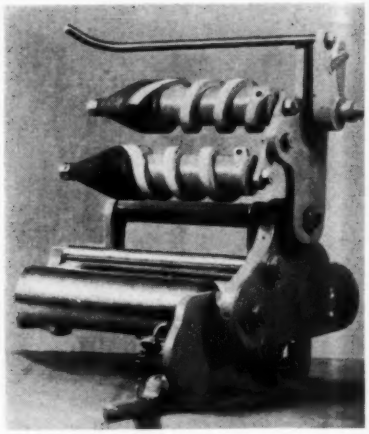
(6) The most water sensitive grade, a low viscosity, partially hydrolyzed Lemol for use as an emulsifying agent, remoistenable adhesives, warp size for acetate and nylon yarns. It is also least sensitive to added salts.

The Lemols are said to provide tough, water-soluble resins combining high tensile strength, adhesiveness and tear-resistance with extreme inertness to aging, oxidation and bacterial action.

• Unit for Taking Out Turned Selvedges

The "Taker-Outer", a new product of the Guider, Roll and Service Company, Daytona Beach, Fla, for taking out or turning back turned selvedges, features a pair of spiral rolls 9" in length, which are driven by cloth passing between them.

"Takers-Outers" reportedly can be attached to existing cloth guiders or can be supplied with brackets and used where cloth travels in open form. A regularly-supplied attachment to the unit tightens the selvedge of the cloth before taking out the turned selvedges.



G, R & S "Taker-Outer"

Ball- and oil light bearings are used throughout. Stainless steel operating parts can be supplied in place of other metals where required, according to the manufacturer.

• Emery Unveils New Vegetable Oleic Acid

Emersol 240 Vegetable Elaine, an all-vegetable oleic acil that is said to possess all the properties of commercial oleic acids in addition to superior oxidation stability and an unusually bland odor, has been introduced by Emery Industries, Cincinnati.

Specifications:

Iodine Value	84-90
Acid Value:	191-195
Saponification Value:	192-196
Titer, °C:	15-20
Color (Lovibond, 5¼" cell)	15Y/3R Max.

The present price of this unique oleic acid is reportedly the same as double-distilled oleic acids.

For a descriptive bulletin, and samples, write to: Emery Industries, Inc, Dept 5, Carew Tower, Cincinnati 2, Ohio.

• Titanium-Base Duller

A new titanium-base dulling agent for viscose rayon and acetate fabrics, which is said to be equally effective on whites and colors, has been developed by Dexter Chemical Corporation, New York.

The agent, known as Dextrol Duller #3925, is reported to be particularly effective with urea-formaldehyde resins. Added directly to the resin mix, it readily disperses throughout the solution, according to the manufacturer. Storage life is said to be good.

Finishers of acetate and viscose marquisettes report excellent results.

• "Noraset" Becomes "Norane Four Star"

Ernest Nathan, Vice President of the Sun Chemical Corporation, has announced a change of name for the Warwick Chemical Company Division's new hydrophobic resin. Formerly called Noraset, the new resin will henceforth be known as Norane Four Star.

This change reportedly has taken place in order to avoid confusion between other trade names in the textile industry and to associate Norane Four Star more closely with Norane, a durable water repellent which has been merchandised by the Warwick Chemical Company for the past ten years.

• Laurel Transfer Solvent 622-C

Laurel Soap Manufacturing Co, Inc, Philadelphia, Pa, has completed a multiple series of laboratory and mill tests of their Laurel Transfer Solvent 622-C for the removal of permanent-type hosiery transfers prior to redyeing.

The results have been most satisfactory according to reports. Laurel Transfer Solvent 622-C is a compound of powerful solvents which reportedly may be used in regular dyeing machines, working effectively in either one-time or standing baths. Depending on plant conditions, and within the product's minimum and maximum range, Laurel Transfer Solvent 622-C will remove all types of hosiery transfers.

• New Color Photo on Fabric Here from Switzerland

Swiss craftsmen have developed a new process for printing color photographs on fabric for home decoration, the first example of which has been imported to this country by F Schumacher & Co. The color photograph reproduced on glazed chintz was of Corot's painting "The Dance of the Nymphs." It reportedly retails for $8.25 a yard.

Rene Carrillo, design director of Schumacher's declared the new process may be "the forerunner whereby many beautiful old documents and scenes from nature may be authentically reproduced for the home in full natural hues."

NAMES IN THE NEWS

John J Emery (right) congratulates Joseph Worpenberg for his 50 years service with Emery Industries, Inc.

JOSEPH WORPENBERG of Chicago became the first employee of Emery Industries to receive a diamond service pin in recognition of his 50 years of service with the company. Starting at the Ivorydale Plant when only thirteen, Mr Worpenberg for many of his earlier years worked side by side with his father, who also has a long service record with Emery.

The presentation was made by John J Emery, president of the company, at a special luncheon attended by Arthur Schubert, vice president, John Archiable, works manager, and Ray Brauer, personnel manager at the Ivorydale plant.

Mr Worpenberg is the dean of the "Old Timers Club" sponsored by the company, those who receive watches in recognition of 25 years of service. A special event is being planned by the 50 "younger" members of this group which includes Mr Emery and Mr Schubert, to pay special tribute to Mr Worpenberg.

CHARLES D LANE and SAMUEL A MOSLEY, chemists in the research and development department of The Chemstrand Corporation, have been transferred to Decatur, Ala, from Dayton, Ohio. Both men previously were engaged in research and experimentation at Chemstrand's laboratories in Dayton. Mr Lane joined Chemstrand in June, 1951 and Mr Mosely, in September, 1951. Prior to joining Chemstrand, Mr Mosely served as a chemical engineer for Union Carbide and Carbon Corporation at Charleston, West Virginia, from 1947-1951.

THE following changes in the professional staff of the Fabric Research Laboratories, Inc, of Boston, Mass have been announced:

DR MILTON M PLATT, with FRL since 1946, has become associate director of research in charge of all physical and engineering investigations; DR GEORGE THOMSON has been made assistant director of research, in charge of all chemical investigations; and HENRY M MORGAN and CHAUNCEY C CHU have been elevated to the senior research staff, which has also added MYRON J COPLAN.

DR JOSEPH W LANG has been appointed director of research of the Central Research Laboratory of General Aniline & Film Corporation, succeeding DR HENRY B HASS, who has resigned to accept a position with another company.

Both the appointment and resignation were effective June 1.

On that same date, DR DAVID B ANDREWS became plant manager of GAF at Rensselaer, being promoted from his assignment as manager of process department.

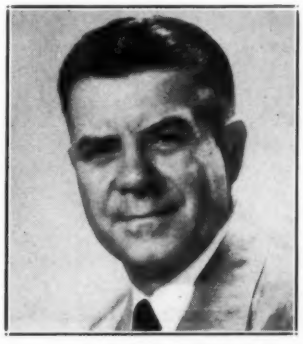
Dr Lang came to General Aniline & Film in 1943 from the du Pont Company where he had been active in research and chemical engineering work in the Organic Chemicals Department. Until assuming GAF's plant manager post at Rensselaer in July of 1950, he was engaged in both production and process development activities for the Company.

Dr Lang's headquarters will be at the Central Research Laboratory in Easton, Pennsylvania.

Dr Andrews, the new Rensselaer manager, started with GAF in 1937 as a research chemist.

CHARLIE WATERS has joined Soluol Chemical Co, Inc, Natick, R I, as technical service and sales representative for Virginia and the Carolinas.

Most recently plant superintendent at Potomac Dyeing & Finishing Corporation, Mr Waters has had more than 24 years experience in the capacities of foreman of finishing at Bradford Dyeing Association (USA), boss-finisher of the rayon, wool and worsted departments at Farr Alpaca Co, superintendent of the woven fabrics dyeing and finishing departments at Tubize Chatillon Corporation, Hopewell, Va, and assistant superintendent of the woven fabrics and knit fabrics dyeing and finishing departments at Celanese Corporation of America, Hopewell, Va.



C Waters

James M McNamee

AMERICAN Cyanamid Company has announced two new appointments to the sales staff of the Industrial Chemicals Division in addition to naming a new supervisor of the New Product Development Department.

DR NOLAN B SOMMER has assumed the supervisory post replacing DR JAMES R DUDLEY, who recently joined the Carwin Company. Dr Sommer served as a research chemist in Cyanamid's Stamford (Conn) Research Laboratories from 1944 to 1947, then was made market development manager for Jefferson Chemical Co, a firm jointly-owned by Cyanamid and the Texas Company.

In the Industrial Chemicals Division, JAMES M McNAMEE has been placed in the Southern territory to do sales work in Georgia and Florida, with headquarters at 1370 Spring St, NW, Atlanta. Mr McNamee was in the rubber industry until joining Cyanamid two years ago. Prior to his present assignment he handled technical service work in connection with several of Cyanamid's synthetic organic nitrogen compounds.

Also in the Industrial Chemicals Division, E W KOFFMAN has been named to the sales staff of the New York District Office. He formerly served as purchasing agent for the division and technical representative for the Petroleum Chemicals Dept. In this new post, Mr Koffman will assist in the sale of products of that department and also devote time to the sale of the Industrial Chemical Division's line in Southern New York. Before joining Cyanamid in 1942, Mr Koffman served as a sales engineer with The Conditioning Company, Newark, N J.

DEXTER Chemical Company (New York) has announced the appointment of JOSEPH J McGUINNESS as director of public relations and advertising. Mr McGuinness leaves his post with Carl Byoir & Associates, public relations counselors, to take over new duties at Dexter's New York office.

For three years Mr McGuinness served as assistant advertising manager for the

Joseph J McGuinness

William B Griffin

Bridgeport Brass Co; prior to this he was associate editor of *American Machinist.*

Dexter has also announced that WILLIAM B GRIFFIN has joined the organization as a district representative in Georgia, Alabama and Tennessee, filling the post left vacant by the recent death of Dudley B Setzler.

Mr Griffin, who represented the Kali Manufacturing Company since 1932, served for two years as secretary of the Southeastern Section, AATCC, and for three years as a Councilor. He first joined the AATCC in 1927. His mill experience, which included positions as chief chemist for the Mason Dyeing Company and the Fabrics Finishing Corporation, served to give him a specialized background in synthetic fibers, warp sizes and yarn treatments, and in chemical processing of textiles.

HERMAN A DICKERT, director of the A French Textile School at the Georgia Institute of Technology, has been named president of the National Council of Textile School Deans. The election took place at the recent semi-annual meeting of the group at Clemson College.

The council is composed of representatives from all of the textile schools in the country. Mr Dickert succeeds DR GEORGE WALKER of the New Bedford Textile Institute.

P G Stevens

DR PHILIP G STEVENS is entering the chemical consulting field and will be located at Old Greenwich, Conn, (PO Box 761). He will be associated with WALTER E SCHEER, who has specialized for a number of years in commercial chemical development and market research.

Dr Stevens has been in the Development Department of General Aniline & Film Corporation for seven years. Prior to this, he was with Du Pont, and taught organic chemistry at Yale and McGill Universities. Dr Stevens will specialize in the more technical phases of organic chemical developments.

CHARLES F H JOHNSON, JR, formerly executive vice president of Botany Mills, Inc, was elected president of that company at a special meeting of the board of directors on May 19th to succeed his father, Colonel Charles F H Johnson, who died on May 9th. Mr Johnson has been associated with the company since 1927, beginning as a part-time apprentice and working his way through the different departments to the executive vice presidency to which he was elevated on March 18, 1952. Prior to that, he had been vice president and general manager since 1945 and a vice president and director since 1938.

At the same meeting, HARRY C TEMPLETON, former vice president in charge of production and assistant to the late president, was elected executive vice president and general manager.

G B MEREDITH has been appointed assistant to the vice president of the Solvay Process Division, Allied Chemical and Dye Corporation and will locate at the Company's New York office. He moves up from the position of chief chemist of the Division's South Point, Ohio, nitrogen products plant.

In his new position, Mr Meredith will assist DR M F FOGLER, who is in charge of the Division's nitrogen plant.

Sidney Cohen

DR SIDNEY COHEN has been appointed a research and development chemist for The Hart Products Corporation, New York, where he will reportedly direct investigations in Orlon and Dacron dyeing assistants, antistatic agents, dyefixatives, etc. He has had 10 years experience in the fields of vinyl polymerization, detergents, gas fading inhibitors, optical bleaches, resin finishes and dulling agents.

THE Dewey and Almy Chemical Company has announced the addition of BENJAMIN GUDZINOWICZ and MALCOLM HECHT, JR to the staff of the company's new plant in Acton, Mass, and JOHN G BROUGHTON, JR, as a salesman for the Organic Chemicals Division.

Mr Gudzinowicz, who will have charge of the control laboratories group, was formerly with Monsanto Chemical Company.

Mr Hecht has been appointed foreman in the new plasticizer area at Acton. He was formerly with the Industry Division of ECA in France where he served from 1948 to 1952.

As a part of the division's expansion program, Mr Broughton will sell copolymer latices to the paint, paper and textile industries. Previously he was a technical sales representative for the Shell Chemical Corporation, and, prior to that, was with the control laboratory of Eastman Kodak Company.

HOWARD S BUNN has been appointed president of Bakelite Company, a Division of Union Carbide and Carbon Corporation, according to a recent announcement by James W McLaughlin, Bakelite's Chairman. Mr Bunn has been Vice-President of Bakelite and Carbide and Carbon Chemicals Company, both Divisions of Union Carbide.

Mr Bunn entered the Carbide organization in 1922 as a salesman of alloy specialties for the chemical industry. After several years as an advertising writer he became advertising manager for Carbide

Howard S Bunn

W Nelson Stoops

and Carbon Chemicals Company. Later he became manager of the Pyrofax Division, and in 1938 he was appointed manager of the Plastics Division.

In 1944 Mr Bunn was made vice-president, Plastics Division of Carbide and Carbon Chemicals Company, and vice-president in charge of sales, Thermoplastics Division of Bakelite Company. He is a director and vice-president of Bakelite Company (Canada), a director of Bakelite Limited (England), a director and vice-president of Canadian Resins and Chemicals Limited and a director of U S Testing Company.

In earlier announcements, Carbide revealed that DR W NELSON STOOPS had been named assistant director of research in physical chemistry at South Charleston, W Va, and JOHN S McGILLY had joined the Textile Fibers Department as a technical sales representative.

Dr Stoops has been active in the Research and Development Department for the past 18 years. During that time, he has furthered the development of commercially important types of Vinylite resins, Vinyon N synthetic fiber, and chemicals used in making dynel. Prominent among his recent projects are fluorine-containing synthetic resins and shock-resistant plastics.

Mr McGilly, formerly assistant manager of the lingerie division of the Sapphire Company (New York), will assist in the development and use of dynel in apparel fabrics.

D C Oskin

WESTVACO Chemical Division of Food Machinery and Chemical Corporation has announced the promotion of DONALD C OSKIN to assistant manager of sales, replacing JOHN deF MEYLER, who has resigned. Mr Oskin was most recently director of district sales for the organization and for a time was in charge of Food Machinery and Chemical Corporation's Washington office.

DR R H BOUNDY, manager of the Dow Chemical Company's plastics department since 1945, has been named to head the company's research activities. The announcement was made by Dow president Leland I Doan who also said that C B BRANCH, present manager of the company's technical service and development department, would replace Mr Boundy as manager of the plastics department.

The new position of director of research supercedes a committee form of direction under which Dow research had been carried on since the death of Dr Willard H Dow in 1949. The existing executive research committee will reportedly disband, permitting its three members, DRS W R VEAZEY, E C BRITTON and R F BOYER, to devote full time to their regular responsibilities.

Dr Boundy came to Dow as a chemical engineer in 1926 and has been closely associated with many of the company's developments in the fields of hydrocarbons and plastics. In 1945 he was named manager of the plastics department, and in 1950 was elected to the board of directors.

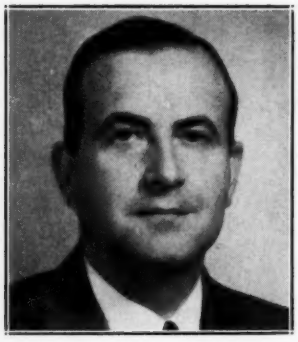
Mr Branch joined the company in 1937 and has been closely identified with plastics during the intervening years. He has been manager of the technical service and development department for the past two-and-a-half years.

Concurrently, Donald Williams, director of sales, named JOHN VAN HORN to replace Mr Branch as manager of technical service and development. Mr Van Horn joined the company in 1946 and has been assistant manager of technical service and development for the past year.

N S Cassel

Hillary Robinette, Jr

J D Fitzpatrick



W J Rothemich

C G Goebel

NORMAN S CASSEL has been elected vice-president of Interchemical Corporation, Hawthorne, N J, concerned with its research and development activities and the direction of its Research Laboratories. He will continue to maintain intimate contact with the Textile Colors Division as its divisional chairman.

WILLIAM J ROTHEMICH succeeds Mr Cassel as divisional president of the Textile Colors Division. Mr Rothemich has relinquished his duties as vice-president of the parent company in order to assume his new responsibilities. He joined Interchemical Corporation in 1933 and became president of its R-B-H Division in 1947.

DR A E GESSLER, Interchemical's director of research since 1934 and vice-president since 1944, becomes emeritus director of research and will continue as a full-time consultant on research problems.

AMONG those selected to serve as members of a reception committee at the Rensselaer Polytechnic Institute Industrial Council's recent two-day symposium devoted to the study of the oil industry were four leading figures in the textile manufacturing field. These included SANFORD L CLUETT, Cluett, Peabody & Co, Inc; RICHARD C HOLDEN, F C Huyck & Sons, Inc; HARRY ELDRIDGE, F C Huyck and LESTER R PARKER, Albany Felt Co.

HILLARY ROBINETTE, JR, research director of Amalgamated Chemical Corp since 1948, has announced the opening of his own offices in Ardmore, Pa, on June 16 as chemical consultant to business and industry. He will continue as a consultant to Amalgamated on textile wet processing problems, paper chemistry and leather chemistry.

Mr Robinette formerly served as manager of the new products division of Pulicker Industries, member of the staff of the sales promotion division of Commercial Solvents Corp, president of the W H & F Jordan Manufacturing Co, and research chemist at Rohm & Haas Corp, all of Philadelphia.

W D MORRISON has been named assistant manager of the Product Development Department of the Chemical Division of Celanese Corporation of America, assisting J MacFARLAND. ALAN K JEYDEL and MICHAEL J CURRY join the Department as product development engineers, and G H WIECH, as a technical service engineer.

Other recent moves by Celanese include the naming of D D HECHT as director of the Application Research Laboratory at Newark, N J, and W D MATTHEWS as a sales representative of the Organic Chemical Department.

Previous affiliations include: W D Matthews—N J Bell Telephone Co; A K Jeydel—Pennsylvania Salt Manufacturing Co; M J Curry—American Cyanamid Co; G H Wiech—Crucible Steel Company of America, Congoleum-Nairn, Inc, and Heyden Chemical Corporation.

JOHN MILLICHAMP, a member of the Cornwall and District Textile Association, was elected president of the Textile Technical Federation of Canada at their recent annual meeting. He succeeds HENRY K TORPEY. E A BLACK, president of the Textile Society of Canada, Western Division, and R F BROWN, a member of the Canadian Association of Textile Colourists and Chemists, Ontario Section, were elected vice-presidents.

J D FITZPATRICK will become the first recipient of a research fellowship in the Graduate School of Applied Science of the University of Cincinnati to be sponsored by Emery Industries, Inc of Cincinnati.

Mr Fitzpatrick, who joined Emery in 1935, will continue on a broader scale work he has carried on since 1943 when he became the first manager of the Company's new Chemical Research Dept. DR CHARLES G GOEBEL, with Emery since 1943, will succeed Mr Fitzpatrick as head of this department.

Mr. Fitzpatrick developed the first practical method for the chromic acid oxidation of Oleic Acid to produce Azelaic and Pelargonic Acids. Dr Goebel's research has resulted in a new plant to manufacture a dimerized fatty acid, dilinoleic acid. Marketed as Emery 955 Dimer Acid, it has enjoyed success in the fields of adhesives and surface coatings. Their most recent activity concerned the development of an ozone oxidation process for producing Azelaic and Pelargonic acids from Oleic Acid.

DONALD V MAGNUSON, formerly manager of research at Precision Scientific Company for over four years, has been appointed director of research and development for Labline, Inc, Chicago, manufacturers of instruments, apparatus and furniture for laboratories.

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